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THE EFFECTIVENESS OF TELEVISION VIDEO TAPE INSTANT PLAYBACK IN LEARNING THE PITCH AND RUN SHOT IN GOLF

by

Barbara Bramlette Smith

A Dissertation Submitted to
the Faculty of the Graduate School at
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Approved by

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ABSTRACT

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The purpose of this study was to determine the effectiveness of using television video tape instant playback in learning the pitch and run shot in golf. The effectiveness of four different teaching methods was compared. Prior to the study itself, a pitch and run shot test was constructed to be used in assessing a golfers' ability in executing a pitch and run shot.

Test Construction

Five advanced, two intermediate and four beginning golfers were administered a pitch and run test constructed by the investigator. Analysis of data revealed that the test was highly reliable (r = .97). A further check was made using the subjects in the study itself, thirty-seven beginning golfers, and again the test was found to be a reliable measure of the pitch and run shot (r = .83).

The test was accepted as a valid measure since it requires the students to loft the ball and run it toward the cup which is the objective of a pitch and run shot. Using the data from the diverse skill level performers mentioned above, it was found that the test did discriminate between advanced and beginning skill levels. On the basis of these two criteria the test was accepted as a valid measure of the ability to execute a pitch and run shot.

A further validity check was made by correlating the average form rating of three competent judges with the scores made by thirty-nine college women students enrolled in beginning golf classes at the University of North Carolina at Greensboro. Data revealed no more than a chance relationship between form and accuracy in executing the pitch and run shot.

Experimental Study

The population studied were thirty-seven undergraduate college women students who elected to enroll in four beginning golf classes at the University of North Carolina at Greensboro. Subjects in the study were equated on the basis of: no previous instruction in the pitch and run shot or golf playing experience; sex; age (range of eighteen to twenty-one years); and general motor ability scores as assessed by the Scott General Motor Ability Test.

Each class met for two fifty minute periods weekly. The duration of the study was four instructional periods followed by a testing period. The investigator administered all instruction and testing. A table of random numbers was used to assign treatment variables to the four groups. Group I received traditional instruction while Group II received traditional instruction in addition to student-teacher analysis of video taped performances. Group III also received traditional instruction plus student analysis of taped performances. Group IV viewed a loop film, constructed by the

investigator, of the investigator executing the pitch and run shot in addition to student analysis of taped performances.

After the four instructional periods, the pitch and run test was administered to the four groups. The test results were treated statistically by the analysis of variance technique. No significant differences among the four groups were revealed. Therefore, it was concluded that there was no difference in the effectiveness of the four instructional methods used in this study in teaching the pitch and run shot to the population studied.

Conclusions

Based upon the results of statistical analysis of data and within the limitations of the population studied and design used in this study, the following conclusions would appear to be justified.

1. Reliability coefficients which varied from .83 to .97 indicated that the pitch and run test constructed was a reliable measuring instrument.
2. The groups used in the experimental phase of the study were alike with respect to previous experience and instruction in golf, age, sex and motor ability.
3. With respect to the four methods of instruction used in teaching the pitch and run shot, there were no statistical differences among the four groups.
4. Students indicated that they had a better understanding of the pitch and run shot after having viewed their own performances on the video tape.

APPROVAL SHEET

This dissertation has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Dissertation Adviser _____

Oral Examination Committee Members _____

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July 13, 1968
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CHAPTER I

INTRODUCTION

In order for the physical education teacher to communicate most effectively with the learner, it is important that he know something about the theories of learning, the nature of the learner and methods of expediting motor learning.

Understanding of the theories of learning is important for it is within the framework of learning theories that learning takes place. A review of learning theories is presented elsewhere in this paper. It is imperative also in physical education that the teacher have a knowledge of the nature of the learner as to sex, age, and intelligence as well as an understanding of the skill level of the learner. The physical educator should know the stages of growth and development of those with whom he works. He must know at what age to introduce certain activities as well as recognize the individual differences within each age group, and he must know what research has indicated for teaching regarding sex, age, and intelligence. Among many other knowledges he should be aware of the importance of vision and perception in teaching motor skills.

The most effective method to use in teaching motor skills has been a concern of physical educators for many years. The teacher should be constantly revising old methods and employing new methods that will insure the best possible

learning. To be sure, many and various methods have been experimented with to enhance and augment the learners' experience. These have included problem solving techniques, programmed instruction, audiovisual aids, independent study and various other forms of instruction. A more recent source of concern has been the developing stream of educational thinking regarding technological devices used as aids in teaching.

Technological media are flooding the market each day to be used as adjuncts to teaching. There are some educators who fear being replaced by a machine and some who feel that the machines are worthwhile, yet will never take the place of the teacher. Bowen stated that "...no one of these devices, not all of them collectively, have become more than supplemental and peripheral elements of formal teaching at any level from kindergarten to graduate school."[29:47] Bowen continued by saying "...or is it that further research and development are needed before the new hardware can become a major educational tool?"[29:47]

A variety of aids have been used to assist teachers in the teaching of motor skills. Because of the variety of aids used, caution is needed in comparing and evaluating the studies reported unless the type of aid used is equivalent in content. Even though we are well aware of the fact that visual aids can help and improve learning, we do not know the relative effectiveness of different types of aids. In

a study by Dwyer, concerning the effectiveness of different types of visual illustrations, it was concluded that no evidence was found to support the fact that one type of visual illustration is more effective than another.[37:250]

A survey was made also of activities in which a type of aid was used to supplement the teaching-learning process. In general, motion pictures seem to increase the amount of skill learned,[41, 53, 43] serve as a motivating device, and increase the speed of learning.[43] Friedrich believes at the present time that the use of loop films are more effective in teaching a motor skill than conventional motion pictures.[40] The values of using loop films are: repetitive factor, a continuous sequence of one skill at a time, reality, timing, slow motion, stop action, accurate demonstration, freeing of the instructor for individual help while others watch the loop films and motivates interest.[60, 40, 57, 44] Dwyer feels that "justification for the use of various types of visual illustrations should be based on their distinctive contributions of specific types of learning."[37:250]

A more recent type of aid that seems to have potential in teaching motor skills is the television video tape. Television video tape instant playback has been used (and apparently effectively) by coaches of athletic teams to show the athlete immediately the skill performed or the strategy of the whole game situation.[33, 34, 59] Video tape instant

playback has been used in Micro-teaching at Stanford University[97] and at the University of Maryland[100] as well as in guidance and counseling training programs, Peace Corps training, and various other educational areas.

Even though the institutions and instructors who have used television video tape instant playback in teaching and coaching feel that this technological medium is effective, only one research study[85] was located to verify their beliefs in relation to motor skill learning in physical education activities.

Therefore, it was felt that there was need to investigate the effectiveness of using video tape instant playback in teaching motor skills. A control situation was needed and the activity selected was golf. The investigator, having taught golf to college women students for ten years, chose golf because of the values inherent in the game as well as the wide interest in the activity.

The pitch and run shot was selected because of its vital importance to the total game of golf. A player must have a good approach game, because more than one-third of his shots will be played approaching the green. Also, the pitch and run shot is simply a portion of the total pendulum swing; thus when taught properly, the beginner is able to move from the full swing to the approach swing or from the approach swing to the full swing with little difficulty.

Since this study was concerned with the most effective

method in teaching the pitch and run shot in golf to college women students, using television video tape instant playback as the variable, attention was focused on research that had been done in golf teaching as well as aids used.

It was noted in reviewing the literature that technique in executing the pitch and run shot varies depending upon the skill of the player as well as the skill level progression and choice of club. For example, many professional golfers use an open stance and position the ball opposite the right heel in the address position whereas most beginners are taught a square stance with ball placement opposite the mid-line of the body or slightly forward toward the target side. Clubs used vary all the way from a number five iron through the wedge.

In summary, there is a definite need to investigate the use of television video tape instant playback in teaching-learning motor skills. Thus, this study was mainly concerned with the method of using an aid in placing the student and teacher in an optimum learning situation. The aid used was a technological device known as the Sony Videocorder.

CHAPTER II

THE PROBLEM

Learning is a complex phenomenon. The proliferation of knowledge plus increased enrollments of students in the past several decades have presented vast instructional problems in education. In an effort to cope with these educational problems, educational television has been used extensively as an instructional medium. The question has not been whether the use of television was 'good' or 'bad', but how best to use this technological medium. With the increased use of aids of all types and their significant effects in the teaching-learning process, there seems to be every indication that the use of television video tape instant playback would also affect the teaching-learning of a motor skill. The investigator was able to find only two completed studies[70, 85] and one pilot study[98] which evaluated the effect of video tape instant playback in teaching a motor skill. With the apparent potential evident, it was decided to conduct a study to attempt to determine the effectiveness of this technological medium.

STATEMENT OF PURPOSE

The purpose of this study was to determine the effectiveness of using television instant playback, in learning the pitch and run shot in golf. Four different teaching methods, three of which involved the use of

television instant playback, were devised for comparative purposes. The four methods of instruction are described below.

Group I: Traditional Method. A method in which subjects received lecture, demonstration and practice in the pitch and run shot.

Group II: Traditional Method plus Student-Teacher Analysis of Taped Performance. A method in which, in addition to the traditional method of instruction, each subject's performances were video taped and played back immediately for analysis by both student and teacher.

Group III: Traditional Method plus Student Analysis of Taped Performance. A method in which, in addition to the traditional method of instruction, each subject's performances were video taped and played back immediately for analysis by student only.

Group IV: Loop Film plus Student Analysis of Taped Performance. A method in which subjects viewed a loop film of the investigator executing the pitch and run shot for three minutes each period in addition to student analysis of taped performances of themselves executing the pitch and run shot.

DEFINITION OF TERMS

Aids

Any device used by the teacher or investigator to aid instruction.

Television Video Tape Recorder

"...an electro-mechanical device which makes possible the electronic recording and immediate playback of television visual images and sound on magnetic tape."[65:1] Videotape is used when referring to Ampex Corporation equipment. Most other manufacturers use video tape.[65:1] Other than in direct quoting, video tape will be used in this study.

Monitor

"Viewing Monitor: a device which decodes the electronic signals from tape recorder reproduction and (with the addition of a sound system) converts them to recognizable pictures and sounds."[65:1] This device will be referred to as a monitor.

Portable Television Tape Recorder

"A recorder reduced to a size which is sufficiently small and rugged to be carried from place to place by one or two people."[65:1]

Playback

The recording of a visual image and playing it back instantly for viewing.

Traditional Teaching Method

The method of teaching a motor skill through lecture-demonstration and analysis by the instructor as well as practice by the learner.

Student Self-Analysis

An analysis made by the learner having viewed her previous performance on the monitor.

Pitch and Run Shot

An approach shot used when the ball is "...no more than 100 yards from the green [12:196]...which travel [s] through the air over the fairway grass and land [s] on the green with enough roll to get it within good putting distance of the cup."[4:60]

CHAPTER III

REVIEW OF LITERATURE

The review of literature was conducted in the following areas: learning theories; aids in teaching; and portable television video tape instant playback. These three areas seem to be pertinent to a study of this type.

LEARNING THEORIES

If physical education is to fulfill the role of helping to educate the total child, it follows that in teaching movement, fitness, and play, physical educators must base their program content and teaching methods upon a sound knowledge of learning principles. Physical educators concern themselves primarily with motor learning: however, they should realize that learning is learning. In order to gain a better understanding of how learning takes place, the first section in this review of literature is concerned with theories of learning and how they may be applied in teaching physical education.

Learning has been popularly defined as changed behavior, yet this definition does not take into account changed behavior brought about by native response tendencies, maturation, and changes that occur because of fatigue and habituation.[14:2-5] Learning can be defined, according to the above theory as changed behavior that is not brought about by inborn responses, maturation, or temporary states

of the organism.

Even though it is difficult to describe a learning theory, Cratty has defined a learning theory as follows:

> ...a set of theoretical assumptions which attempt to explain such phenomena as forgetting, retention, the role of practice, performance of variations, learning limits, the influence of rewards, and the types of cues which cause learning to take place.6:216

From this definition many questions can be asked relative to the limits of learning, the role of practice, transfer of learning, the place of understanding and insight, and the role of retention and forgetting.

There is no one comprehensive theory that can or does answer all of the questions concerning all aspects of learning. As stated by Clayton "learning theories range from quite spcific concerns with particular stimuli and responses to explorations of the total personality of man in society and his resultant behavior systems, both overt and covert."[5:47]

The writer accepted for review Oberteuffer and Ulrich's suggestion that "...theories of learning have tended to group themselves in four general categories: (1) the theory of connectionism, (2) the theories of conditioning, (3) the field theories, and (4) the functional theories."[19:241]

Connectionism Theory

The theory developed by Edward Lee Thorndike and Robert S. Woodworth and their associates at Columbia University in the late 1890's has continued to influence

educational practices to the present time. This theory is known as the bond theory, the connectionism theory or the original S-R (stimulus-response) psychology of learning. This theory implies that learning takes place best when the connection (bond) between the stimulus and the response is strengthened. Inherent within this conceptual framework is the law of readiness, the law of exercise, and the law of effect.[23]

There has been confusion as to the exact meaning of the law of readiness, mainly because Thorndike's theory referred to a type of getting ready for action, where as most explanations at present are in terms of laws about growth. Hilgard and Bower explained Thorndikes' position as follows:

> When an action tendency is aroused through preparatory adjustments, sets, attitudes, and the like, fulfillment of the tendency in action is satisfying, nonfulfillment is annoying. Readiness thus means a preparation for action. 14:18

Thorndike's[23] law of exercise, though greatly reduced in his later years of study, postulated that connections were strengthened with practice (law of Use) and weakened or forgotten when practice was discontinued (law of Disuse). This implies that learning is facilitated by frequent and correct practice. "Later it was expostulated that mere repetition did not strengthen the S-R bonds but that motivating conditions (including knowledge of results) were necessary for learning to take place."[6:217]

The law of effect theorized that a connection was strengthened or weakened as a result of its consequences. This statement, first set forth by Thorndike, later caused considerable dispute among learning theorists. The idea that learning occured as a result of reward or reinforcement was not fully accepted. When the law of effect was stated in the following form, as quoted by Kimble and Garmezy, no one took exception:

> The most straightforward of these several versions of the law of effect is the empirical law of effect, according to which organisms, as a matter of fact, tend to repeat in a given situation the responses for which they have previously been rewarded.15:193

The version that has not been fully accepted is that learning does not take place without a reward of some type. In later years, according to Hilgard and Bower, Thorndike reduced "...the importance of annoyers relative to satisfiers and added some new phenomena, but the central importance of a modified law of effect persisted in Thorndike's final statements of his position."[14:20-21] Probably the greatest meaning Thorndike's theory has for the physical educator is the importance he placed on motivation, his belief that learning is specific and the reward or satisfaction one feels when he is successful.

Therefore, in teaching the pitch and run shot in golf, according to the connectionism theory, the student would be taught the correct way to execute the skill and the student

would practice the skill, with corrections by the teacher. This type of teaching-learning would continue until the student reached the skill level of proficiency required by the teacher or course, or desired by the student.

Conditioning Theories

The conditioning theory cannot be mentioned without thinking of Ivan Petrovich Pavlov. His scientific influence is still present today some thirty-two years after his death. Although Pavlov conducted numerous experiments, his most often cited work is the experimentation using animals (the salivating dog) to explain that animals could be conditioned to respond to certain stimuli. From these experiments Pavlov identified what we know as conditioned reflexes. He felt that the conditioned reflex was strengthened with repetition by reinforcement and that transfer was in terms of generalizations, but he was not too concerned with retention or forgetting.[14:70]

John B. Watson followed Pavlov in time and is considered to be the founder of the behaviorist school of psychology.[5:49] His work was done mainly with animals. Although, he expounded no definite theory, he did explain the conditioned reflex further by stating that practically all behavior is learned. He attempted to refute Thorndike's law of effect and to substitute the laws of frequency and recency.

While the frequency-recency theory did

> not survive its criticism..., it serves to point up Watson's desire to find objective laws to substitute for those with even a tinge of subjective flavor.14:75

Following Watson, Edward R. Guthrie, a conditioning theorist, postulated one simple law of learning. This law was stated by Guthrie as follows: "A combination of stimuli which has accompanied a movement will on its recurrence tend to be followed by that movement."[10:26] A typical example of Gurthrie's work is that of picture sequences of cats getting out of a maze by following the same movement pattern each time in touching the pole, opening the door, and learning.[5:31] Guthrie was not concerned with reward, punishment, reinforcement, thinking, and meaning. He simply stated that what one does under a given set of conditions one will repeat under similar conditions. His one great cause was the need for simplicity in laws of learning. He did not stress such things as readiness, practice, motivation, understanding, transfer, and forgetting; yet, he could explain these facts using his previously stated laws.

B. F. Skinner,[22] another conditioning theorist, postulated that the reinforcement following the response to a stimulus is important to learning. Due to the advent of technological media as aids in teaching as well as programmed learning, Skinner's theory has received recent attention. For example, in the use of television video tape instant playback there is immediate knowledge of results, and thus, it can be assumed, reinforcement. The same is true in

programmed learning where the knowledge of results is immediately evident.

Skinner[22] defined two kinds of stimuli which cause a response: the response that is caused by a known stimulus and the response caused by an unknown stimulus. The former is known as "respondent behavior" and the latter as "operant behavior."

Still another conditioning theory is that postulated by Clark L. Hull who was concerned with a detailed analysis of the stimulus and response reaction. In explaining how Hull described learning, Clayton stated that "...learning, for Hull, is to be understood as a matter of associating stimuli and responses under conditions of drive, leading to reinforcement through need reduction."[5:52]

Although the conditioning theorists do not stress the same points equally, there is similarity in their thinking. Perhaps the primary implication for teaching a motor skill is that of reinforcement. Thus, concerning themselves with only the stimuli and responses in explaining learning, the conditioning theorists had no need to concern themselves with "thinking." The field theorists, to be discussed next, differ from the conditioning theorists in that they concern themselves with what goes on in the learning process between the stimulus and response.

Field Theories

The positions of the Gestalt psychologists are

identified most closely with Kaffka, Wertheimer, and Kohler. The Gestalt theory was developed in Germany around 1912 by Max Wertheimer.[14:229] In fact, Germany is credited with sending to the United States, via Kaffka, Wertheimer, and Kohler, the theory of transfer by transposition,[16:363] which is the position of the Gestaltists. These theorists were interested in what goes on between the stimulus and the response. This, they believed was the clue to understanding how learning takes place. Acceptance of such a belief was a direct attack on Thorndike and the behaviorist school of psychology. The ciritiqism of the field theorists was mainly in the trial-and-error aspect of learning.

From the Gestalt psychologists we have the principle that the whole is greater than the sum of its parts. Inherent in Gestalt psychology then is that in order for learning to be effective the learner must see the relationships of the parts within the whole. Cratty described Gestaltism as an "awareness of relationships and meanings among various parts of a problem, between problems, and between the part and the whole..."[6:221] He continued by stating that "transfer of learning, or 'transposition,' is assumed to take place as a pattern of dynamic relationships are found to be similar in two situations."[6:221]

According to Hilgard and Bower's summary of the Gestalt theory,[14:257-258] the following statements can be made:

1. Capacity. Because learning requires differentiation and reconstruction of fields, the higher forms of learning depend very much upon natural capacities for reacting in these ways.
2. Practice. Changes to on without repetition, not as a result of repetition.
3. Motivation. Goals represent end-situations, and as such modify learning through the principle of closure.
4. Understanding. The perceiving of relationships, awareness of the relationships between parts and whole, of means to consequences, are emphasized by the Gestalt writers.
5. Transfer. A pattern of dynamic relationships discovered or understood in one situation may be applicable to another.
6. Forgetting. Traces may disappear through gradual decay (a possibility hard to prove or disprove), through destruction because of being part of a chaotic, ill-structured field, or through assimilation to new traces or processes.

In applying the Gestalt theory to the teaching of the pitch and run shot in golf, the instructor would teach the whole skill rather than break it down into parts such as the grip, stance, and swing. The parts would be inherent in the total skill to be learned. This theory suggests that the whole of a thing to be learned should be presented in

as large a segment as the learner is capable of assimilating.

Functional Learning Theory

The fourth and final theory to be discussed is the functional theory of learning. John Dewey is said to have founded functionalism. He felt that the activity of learning should not start with the stimulus, go through a central process, and then emerge in a response. Hilgard and Bower stated that Dewey felt "...the activity is a complete cycle - a 'reflex circuit' - in which the response may seek or 'constitute' the stimulus."[14:298] When Dewey left the University of Chicago (where functionalism had its early beginning in America), he never concerned himself with laboratory psychology again. His greatest contribution was in the field of education, yet he has had lasting influence in the psychological aspects of learning due to his early work. Dewey is remembered for his influence on learning in the classroom, for his work in carrying on the pragmatic traditions of the past which he also had a great part in developing, and for his work as a social psychologist.

The functional theory in America is linked with such men as James, Hall, Ladd, Catell, Seashore, Carr, Robinson and Angell, and Woodworth. These men were free to learn from all the other theories of learning and by so doing gave the functional theory it's eclectic character.

The basic belief of the functional theory of learning is "...that activity is the most important aspect in human adaptation and that environment causes certain types of functional behavior which man must learn if he is to exist." 19:243

A great many laws of learning have been set forth by the functional theorists. For example, Robinson[21] listed the following laws as factors in determining the rate of learning: law of contiguity, law of assimilation, law of frequency, law of intensity, law of duration, law of context, law of acquaintance, law of composition, and law of individual differences.[14:310] These laws suggest the aspects of learning with which the functional theorists were concerned. Though all of Robinson's ideas were not accepted as laws, they were nevertheless a type of classification from which to study learning. In general the functional learning theory has been centered around four basic laws: the law of contiguity, the law of assimilation, the law of frequency, and the law of intensity . Through experimentation, a great deal has been learned through the application of these laws with respect to length and distribution of practice periods, the characteristics of the learner in regard to the rate of learning and the amount of material that can be learned at a given time.

In summary it can be said that the functional theory has had the greatest impact in the twentieth century on how

learning may be explained. This may be due to the eclectic approach to the many facets of learning undertaken by the functional theorists.

In reviewing the four cited theories of learning, it would seem evident that some aspects of each are important to all learning.

RESEARCH RELATED TO AIDS TO TEACHING

There have been a number of studies which have been conducted in an effort to determine the value of aids in teaching a motor skill. Such aids as the following have been utilized: motion pictures of experienced performers; motion pictures of the subjects themselves; loop films, golf-lite, golf-o-tron; the head stabilizer in golf; the ball-boy in tennis; pictures, slides, and models of various kinds. Some of the studies have involved stop action and slow motion features in using the photographic aids.

Films As Aids To Skill Acquisition

A number of researchers have found motion pictures of experienced performers as well as motion pictures of the performers themselves contributed to interest, attention and motivation in students' learning of the required motor skill.

The first experimental study to determine the feasibility of using film in teaching motor skills was done by Ruffa in 1931.[88:60] Ruffa made a film of five athletic events using an experienced performer as his subject. He

used three groups of subjects in the experimental phase of the study: a visual aids group, a group taught by the "so called" traditional method, and a group which received no instruction. The groups were composed of high school boys with an average of forty boys in each group. Ruffa found, on the basis of pretest-posttest scores, that "a slow motion picture unit is three and nine-tenths per cent more efficient than oral and demonstration method now used."[88:80] He stated that the film group was better motivated to improve more than the other groups. He concluded by indicating that films are feasible tools in teaching certain athletic skills.[88:80]

Bartruff[68] conducted a study similar to that of Ruffa's in 1938 using seventh grade boys. He taught elementary tumbling and concluded, on the basis of pre-test-posttest data, that the slow motion film is of value in teaching tumbling.

The study by Priebe and Burton[55] has been given much attention since 1939. The subjects used were twenty-six high school boys who volunteered to be coached in the high jump. The purpose was to determine the value of the slow motion pictures in coaching. The experimental group viewed motion pictures of experienced performers as well as motion pictures of the subjects themselves, and in addition received instruction from and saw demonstrations by the coach. The control group was given instruction and

demonstration only. After six weeks' duration the results indicated that: the experimental group (group utilizing the motion pictures) showed faster progress and better achievement; the initial trial and error period was eliminated; in the early stages of learning the experimental group was better (demonstrated more skill) than the control group; the experimental group changed from a known skill to a new skill with greater facility than did the control group; motion pictures enabled the coach to handle larger numbers more effectively; and motion pictures contributed to the interest and attention of the boys.

There have been researchers who have reported no significant difference in film groups and non-film groups.

Brown and Messersmith,[30] in 1948, conducted a study in tumbling which also used motion pictures of experienced performers as well as motion pictures of the subjects performing the skill. Subjects were forty-three college freshmen men who were considered to be beginners in tumbling. The experiment lasted for seventeen class periods. The instruction was identical for both the experimental and control groups through the first four lessons. The experimental group was shown motion pictures of experienced performers during the fifth lesson and motion pictures of themselves performing the skill during the thirteenth lesson. The control group received the traditional

instruction throughout the seventeen class periods. Brown and Messersmith concluded that the experimental group did not differ significantly from the control group although the experimental group did seem to have been motivated by the films. The authors felt that the cost of film was too great to warrant expenditure unless they were to be used for a longer period of time.

Two additional studies using motion pictures of experienced performers as well as motion pictures of the subjects themselves performing the skill were conducted by Tate[90] in 1956 and Wyness[96] in 1959.

Tate's investigation involved three classes of college freshmen women who were below average in body mechanics skills as judged by the college freshmen testing program. The three groups were equated on the basis of scores on a motor ability test. All three groups were given normal amounts of the traditional method of explanation and demonstration. In addition one group (the kinesthetic method group) was given instruction with a conscious awareness of position and movement relationships. The third group had additional visual aids such as posters, charts, selected films, and self-performance films (the latter being used more frequently). The results were that all groups improved and that "...the visual aid group made the most gains in both static and dynamic posture."[90:909]

Wyness' purpose in conducting his study was to determine the effectiveness of motion pictures as an aid in teaching a gross motor skill. The gross motor skill used was putting the shot and the subjects were male students considered to be beginners in the skill. Four groups of subjects were used with the length of the study being fifteen weeks. Each group was taught by the lecture-demonstration method. In addition to the lecture-demonstration method one group saw movies of champion performers; the second group saw movies of themselves putting the shot; a third group saw movies of champion performers as well as movies of themselves; and the fourth group saw no movies. Wyness concluded that more interest was shown by the movie groups, but there was no greater improvement in skill by any one of the movie groups than would be expected by a lecture-demonstration method of teaching.

Some researchers suggested that even with using loop films of experienced performers that there were no final learning differences. However, the same research studies indicated that loop films might enhance learning at special intervals.

Probably the most often cited study in golf involving the use of slow-motion loop films of experienced performers is a study by Nelson[51] done in 1958. For the most part, Nelson used beginners in golf. His subjects were fifteen college men and thirty-two college women equally

divided into the experimental and control groups. A pretest was given to equate the groups followed by five weeks of instruction (fifteen days, one hour each day). Both groups used the seven iron and received demonstration and explanation. In addition the experimental group viewed slow motion loop films of experienced performers. The difference between the means of the pretest and posttest scores showed no significant difference. The author felt, however, that slow motion films aided the instructor in pointing out faults. The author further felt that movies were more advantageous for beginners in the early stages of learning whereas movies for upper skill level students were more advantageous in later stages of learning.

Murin, Hays, and Harley[64] conducted a study in 1952 using men's gymnastic classes as the subjects, "...to investigate the practical implication of the finding that film demonstrations are at least as effective as a live instructor's demonstrations."[64:2] One group was taught by an experienced instructor using the traditional teaching method. The experimental group was taught by an inexperienced instructor. The control group was taught a series of eight tumbling skills by the experienced instructor. The experimental group saw a loop film of an experienced performer performing the same eight tumbling skills for two minutes each class period. The loops were projected on a daylight screen which permits projection of sound

motion pictures in full daylight. A pretest was given to equate the two groups. The final scores consisted of judges' ratings. The conclusions were as follows: "Learning for the film-taught group did occur to a significant extent and can be largely attributed to film demonstration."[64:7] The non-film group, as measured by final performance, was superior to the group receiving film instruction.[64:7] The author also concluded that "using daylight projection of film loops, instructors with a minimum amount of training and experience can teach perceptual-motor skills with an effectiveness approaching that achieved by expert instructors using live demonstrations."[64:7]

Karsner[81] using motion picture loops in a study conducted in 1953, found no difference between groups using the loop films. His subjects consisted of forty-six college men enrolled in beginning badminton classes. One group viewed loops of experienced performers after all strokes were demonstrated and explained; one group viewed loops following each lecture demonstration period; and one group viewed loops without demonstration or lecture. Although no significant difference was found among groups, Karsner stated that "...the motion picture loops were useful for purposes of motivation."[8:1082]

The latest study reported (1967), involving the use of loop films of experienced performers was done by Gray

and Brumbach[42]. They used male college students in four beginning badminton classes. Two groups were used: one control group of thirty-one students and one experimental group of twenty-nine students. Both groups received traditional instruction. In addition the experimental group viewed film loops of experienced performers. The purpose was "...to determine the effect of daylight projection of films, ...on the badminton-playing ability of male college students."[42:563] There were three testing sessions and a significant difference was found in the second testing session in favor of the loop film group. However, no significant difference was found between experimental and control groups during the final testing session.

An interesting study done by Friedrichsen[76] in 1956 used loop films depicting errors in performance and loop films of correct performance in teaching gymnastic skills to college men. On the basis of a pass-or-fail test and a rating test, Friedrichsen found that the group viewing the loop films depicting errors made more progress.

When researchers only took experienced performers into account, it was their feeling that learning rate follows the same general pattern whether done with or without visual aids.

In 1951, Kern[82] used both a motion picture film which she prepared and tracings of the film to determine the effect of visual aids in learning a standing front dive and a running front dive from a one meter board. An experimental group consisted of twenty students learning the standing front dive and eighteen learning the running front dive while a control group consisted of twenty-one students learning the standing front dive and twenty learning the running front dive. Both groups consisted of college women with no previous diving instruction who were enrolled in elementary swimming classes. Both groups received identical verbal instruction. In addition, the experimental group viewed the films and tracings throughout the eight week study. On the basis of judges' ratings the control group was found to be significantly superior in learning the standing front dive while no significant difference between groups was found in learning the running front dive. Kern concluded that "...learning rate parallels very closely whether done with or without visual aids."[82:24]

Drury[73] in 1959 used slow motion pictures of experienced tumblers, drawings of four easy and four difficult stunts, and a live experienced tumbler in determining the effectiveness of visual aids in teaching tumbling. His subjects were eighty randomly selected

college men who were beginners in tumbling. Three classes used slow motion pictures of experienced tumblers, three classes used drawings of the stunts and three classes used as an aid a live experienced tumbler. Drury found no significant difference between groups, thus indicating that no one aid used in his experiment was more effective than the other. Also, there was no difference with respect to the degree of difficulty of the stunt. However, Drury did indicate that viewing visual aids seemed to have been more effective if seen once during the first instructional period, twice during the second and three times during the third instructional period.

In 1964, Hawthorne[78] investigated the use of slow motion pictures of experienced performers in determining their effectiveness in improving form in the golf swing. Subjects used were beginning college women golfers. The experimental group used slow motion pictures while the contol group did not. After both groups had practiced three times, a panel of judges rated their form. Hawthorne concluded that slow motion film is: an effective device to use in improving golf form; an excellent motivational device; and practical from the stand point of time. She

also felt that using slow motion was an effective device in aiding the instructor in detecting golf errors.

When motion pictures were taken of subjects who were attempting to learn a skill, the research indicated that such aids were valuable for both beginning and advanced skill levels.

Fowler[75] also used slow motion pictures in her investigation; however, her study differs from Hawthorne's in that she used slow motion movies of the performers themselves rather than experienced performers. Fowler's study, done in 1955, used two beginning tennis classes, each composed of fifteen college women. The experimental and control groups received identical instruction in the forehand and backhand drive until the tenth lesson of a twelve week experiment. Thereafter the experimental group viewed slow motion movies of themselves during eight different class periods. At the end of the study no significant difference was found between the two groups as judged by the Dyer Tennis Test. The investigator indicated that the students felt the slow motion movies helped in learning the forehand and backhand drive. Fowler felt that the movies had made instruction easier.

Two other studies in which motion pictures of the subjects themselves were used were done by Jones in 1947 and Watkins in 1963. These two studies were conducted in

an effort to determine the effectiveness of using motion pictures of the subjects themselves as a teaching aid.

Jones[80] used college women students in her study. The skills used were the long and short serve in badminton. The experimental group was composed of thirteen beginning badminton players and seven players who had some badminton playing skill. The control group contained the same number of subjects as well as the same skill distribution. The experimental group was shown films of themselves whereas the control group was not. Jones concluded that the greatest benefit of films would be to show films as early as possible after they had been taken[80:72] and that the value of the films comes later in the experiment than other studies reviewed by her would appear to indicate. Jones was not able to draw definite conclusions because of the initial variability of the groups; however, she felt that the films helped to stimulate interest, served as a good motivational device, and were good for form analysis.

Pictures of the performers themselves were used by Watkins[62]. His investigation differs from most other studies in visual aids in that he used skilled performers. The subjects were members of a college men's baseball team. The purpose of the study was to determine the effect of a

subject's viewing of his own filmed performances on improving and correcting faults in batting. The experimental group, ten subjects, viewed films of their own performance and received instruction for correcting batting faults on five different occasions. The control group, ten subjects, received instruction only. The results of this study indicated a greater decrease in batting faults by the experimental group as opposed to the control group. The greatest number of faults were corrected in the early part of the experiment. The batters, when questioned by Watkins, felt that the motion pictures helped them in correcting their batting faults.

An interest in the time of introducing audiovisual materials at different stages of learning bowling skills was evidenced by Watt[92] in 1954. Three groups of beginning college women bowlers were used and were assigned to the following treatment groups: the Audio-Visual Early Group was presented films and diagrams during lessons two through six; the Audio-Visual Late Group was presented films and diagrams during lessons nine through thirteen; and a Control Group which received no audiovisual

instruction.[92:2301] Analysis of data obtained during the experiment indicated the following results:

(1) A low positive correlation existed between general motor ability and bowling skill, and between scholastic achievement and knowledge tests. These correlations were statistically significant.

(2) The majority of students who viewed the audio-visual aids felt that these materials had been helpful. Class interest in the visual aids did not seem to be influenced by an early or late presentation of the aids.

(3) Visual aids did help students gain information concerning a skill. A later presentation of the audio-visual aids was more advantageous than an earlier viewing of the material. This advantage was statistically significant although it represented only a small mean difference, measured in score points.

(4) The bowling scores of these beginning bowling classes did not reflect a difference in meaningfulness of audio-visual aids. 92:2301

In contrast to the aforementioned studies some research indicated that performance was not enhanced by the use of films.

A study in which motion pictures of experienced performers was used was done in 1944 by Lockhart.[48] The purpose of this study was to investigate the value of motion pictures in teaching beginning bowling to college women. Lockhart used two experimental groups who viewed movies of experienced performers and two control groups who did not

view the movies. She found no difference between the groups until after the third week of instruction. Therefore, she concluded that the value of such movies is in later stages of skill learning in bowling.

Value of Visual Aids To Instruction

Numerous articles have appeared in educational journals concerning the use of aids in teaching. The most well known educational writer in audiovisual materials is Edgar Dale. His writing has been in the total area of audiovisual materials as aids in the teaching-learning process and he feels the following values can be derived from films as instructional aids.

Motion pictures can:

1. Present certain meanings involving motion.
2. Compel attention.
3. Help clarify the time factor in any operation or series of events.
4. Bring the past into the classroom.
5. Enlarge or reduce the actual size of objects.
6. Present a process that cannot be seen by the human eye - even by microscope or telescope.
7. Provide an easily reproduced record of an event.
8. Reach a mass audience at a low average cost per person.
9. Build a common denominator of experience.
10. Offer a satisfying aesthetic experience.
11. Give an understanding of relationships of things, ideas, and events. 7:191

Palmer, as early as 1936, reviewed studies that had been done in using motion pictures as teaching aids. She

wrote as follows:

> the results of these studies demonstrate that the proper use of visual materials increases initial learning; effects an economy of time; increases permanence of learning; aids in teaching backward children; and motivates learning by increasing interest, attention, self-activity, voluntary reading and classroom participation. There is therefore, proof of the value of motion pictures in education. 53:235

Concurring with Palmer, Hughes and Stimson wrote in 1938, "experiments show that interest, attention, self-activity, initial learning, and speed of learning are all increased in varying amounts by the use of the motion picture."[43:104] These writers continued by stating that "unity of subject matter, continuity of thought, retention or permanecy of learning are enhanced..."[43:104] though the use of motion pictures.

Davis, writing in 1963, indicated that the use of pictures may help the student become self-reliant and more self responsible.[8:68] He continued his support of the use of visual aids by stating that "...it might be a sketch or a series of photographs which helps him [the student] see a point he had not caught heretofore."[8:68]

Dickter, in describing various types of visual aids in present use (1942) felt that once content of the subject

to be taught was decided that appropriate visual aids helped "...to motivate interest, to enrich subject matter, and to provide specific instructional material."[36:362]

A type of film that has been used a great deal in teaching motor skills as well as in other educational settings is the loop film. Loop films are made from regular 8mm or 16mm film spliced together usually four to eighteen feet in length. Most of them are silent; however, sound can be used.

Friedrich[40] writing in 1953, and Stevenson[60] in 1957, gave similar values to be derived from the use of loop films. Among the values listed by these two writers were the following: eliminates the inadequate teacher from having to demonstrate; provides stop action and slow motion of a skill which is humanly impossible to demonstrate accurately; enables students to help teach one another; frees the teacher for more individual attention to a few students while others are viewing the loops; enables the learner to view the whole skill at once rather than in parts in the beginning stages of learning; makes provision for the sequence to be viewed as many times as necessary with varied commentary if desired; can be used anywhere at anytime with a daylight screen; and tends to motivate

students highly. Friedrich and Stevenson seemed to feel that, of the many values enumerated the main values are in the immediate, continuous, and repetitive factors that are possible with loop films.

Skubic[57] agreed with other writers cited and further stated that "demonstrations through the medium of visual aids have the advantages of reality, timing, animation, magnification, slow motion, and flexibility all of which greatly enhance training procedures."[57:244] Even though Skubic recognized the value of audiovisual aids in teaching, she did point out that films are inferior to expert demonstration and actual practice by the learner in teaching archery.

Mechanical Devices As Aids To Skill Acquisition

Some other aids that have been used in the teaching-learning of a motor skill have been the ball-boy in tennis, the golf-lite, golf-o-tron, and the head stablizer in golf.

When various other types of aids were studied no significant difference was found between the aid and non-aid groups. It was felt that the aids were useful for purposes of motivation and that more interest was expressed by those subjects using the various aids.

Solley and Broders[58] in 1965, studied the value of the ball-boy in teaching the forehand drive in tennis to college women. Two beginning classes were used. One class received instruction only in lessons one through seven and added the use of the ball-boy in lessons eight through fourteen. The other class received instruction and the use of the ball-boy in lessons one through seven and instruction only in lessons eight through fourteen. Solley and Broders stated that teaching machines which control speed and direction are valuable aids in learning the forehand drive. They concluded that if the methods used in their study are to be rotated it is better to start with the traditional teaching method and add the teaching machine later.

The golf-lite, which is a battery powered light attached to the golf club, was used in a study by Mathews and McDaniel[49] in 1962. Their study was undertaken to determine the effectiveness of the use of the golf-lite in learning the golf swing. The subjects were freshmen and sophomore male college students. The experimental group, composed of thirty subjects, received instruction outside. Nine weeks of instruction were given and a

comparison of pretest-posttest results was used to determine the effectiveness of the golf-lite. The investigators felt that more interst was shown by the experimental group and that the golf-lite was beneficial to most students. It should be noted, however, that this study had limitations as expressed by the investigators due to the fact that the instruction was held in different places and at different times. The golf-lite added weight to the club which could make a difference in the swing pattern.

Chui[31] in 1965, conducted a study using the golf-o-tron as a teaching aid. The golf-o-tron is an electronic device which "...uses a modified missle tracking computer and couples this with color photography of a selected golf stroke."[31:147] The purpose of this study was to determine the effectiveness of the golf-o-tron as a teaching aid as compared to the conventional practice range method. Chui used beginning golfers, did all of the instruction, and used pretest-posttest scores to determine the effectiveness of the two methods. He found no significant difference in the use of one method over the other.

Thirty-four college women students enrolled in beginning golf classes were subjects in a study done by

Ryan[89] in 1964 to determine the effectiveness of the head stabilizer in learning the golf swing. The experimental group used the head stabilizer, a mechanical device for stabilizing the head position throughout the golf swing, while the control group received conventional instruction. At the end of the third, fifth and eighth week, motion pictures were taken of all subjects. The pictures were rated by three competent judges. Intercorrelations of the judges' scores were computed. No significant difference was found between any of the groups. Ryan concluded from obtained figures that "...one can...see that if the stabilizer is to be effective, it would probably be during the beginning stages of the learning of the golf skill."[89:27]

VIDEO TAPE RECORDING

The immediate playback feature of television video tape has been used by coaches of athletic teams for a number of years and deemed valuable adjuncts for coaching. At the time of this review, only two completed studies and one pilot study was located in which television video tape instant playback was used as an aid in teaching motor skills.

A study done by Caine[70] in 1966 revealed no

significant difference in bowling scores between those taught by the traditional method and those taught by the traditional method plus the use of video tape instant replay. Four beginning bowling classes at Colorado State College (men and women) were used as subjects. Thirty subjects composed the experimental group and thirty subjects were in the control group. Both groups received traditional instruction. In addition, one day a week, the experimental group practiced bowling skills in front of a television camera and their performance was immediately played back for viewing by the instructor and the subject. An evaluation was made by both. A pretest score was given both groups at the end of the third lesson. After a ten week practice period, a posttest score was determined. Although Caine found no significant difference he concluded that "...based on the evidence from this research, the use of video tape replay has much to offer the profession as we learn how to best use this medium."[70:36]

In 1967, Plese[85] conducted a study comparing immediate video tape replay with the traditional approach in teaching selected gymnastic skills to one hundred and ninety-nine eighth and ninth grade boys. These subjects were enrolled in physical education classes at Lincoln

Junior High School, Fort Collins, Colorado. The subjects were divided into an experimental and a control group. Various methods were used to equate the groups. Both groups received the same instruction. In addition the experimental group performance was recorded on video tape after which the entire group saw the performances played back. The study lasted for seven weeks (two instruction periods per week). Based on the evidence from the data obtained, Plese concluded that: there was a significant difference in the two groups; the traditional method of teaching is aided by the use of video tape immediate playback; the experimental group advanced more rapidly to more difficult stunts than did the control group; "...more of the experimental subjects were able to complete the entire basic gymnastic routine which also appears to be an indication of the efficacy of this media [television video tape instant playback]."[85:103]

A pilot study was done by Hirsch[98] in 1967 using college women at Kent State University as subjects in teaching the full swing in golf. Four freshmen physical education majors enrolled in beginning golf served as subjects. They met for five weeks, three times a week.

Subject A received television instant replay twice (4 swings each session plus replay of 4 swings) with no verbal correction and subject B received the same video replay treatment, but with verbal correction. Subject C received two treatments with loop films. Each session consisted of viewing 8 master swings. Subject D served as the control.

Conclusions of the pilot study were as follows:

1. The television instant replay groups (A&B) improved more than the other groups (C&D), but this difference was not statistically significant.

2. There was more improvement in the full golf swing when television instant replay was used without verbal correction, however, the difference was not significant. 98:1-2

A great deal of experimentation has been carried on in the area of student teaching in teacher education programs using television video tape instant playback.[54, 66, 84, 100]

Acheson, a member of the teaching staff at Stanford University and the first coordinator of video taping there, did research in the area of supervisory techniques. He

> ...concluded in his study of supervisory techniques, with and without the use of videotape that the addition of television recordings to both direct and indirect styles of supervisory conferences increased the supervisor's ability to change specific

> teacher behavior as observed in a subsequent recording.84:8

Special projects have been undertaken at the University of Florida, by Landsman and Lane, in using video tapes in counseling education. One such use has been in the area of student role-playing in counseling techniques. "In this way each student-counselor has an opportunity to play both counselor and counselee and to see himself on the television screen as others see him." 47:25

Landsman and Lane concluded:

> There seems to be no doubt that audio-visual media [television video tape instant playback] will be sought by conscientious and progressive counselors as the demands of the new age are felt, both in counselor training and in counseling itself. 47:28

According to James Thornton, director of Peace Corps Training Program at San Jose State, California, a video tape recorder fulfilled all expectations in training Peace Corps Volunteers for teaching assignments in the Philippine Islands.[45:852] It was felt by trainers that "by seeing themselves as others see them, the corpsmen could more readily correct their teaching faults and improve class presentation."[45:852]

Speed pointed out many advantages in using video tape instant playback in teaching physical education. He stated:

> nothing could be more valuable to the track coach...to the baseball, tennis, and golf coaches for the style and form in strokes and turns...and there is not a better way to use and get coaching points across than to have the performers study themselves in action.59:88

Probably the most valuable characteristic of instantaneous playback is found in the theory of psychology of learning in relation to immediate knowledge of results.[65] Wade stated: "learning psychology teaches that immediate knowledge of results' speed learning since it serves both as (1) reinforcement for correct responses or behavior, and (2) correction for incorrect responses for behavior."[65:10] In continued by saying:

> particularly is this true in the area of skill acquisition where immediate knowledge of results is important. For example, athletes can perform an action requiring skill and coordination, review it immediately and take corrective steps.65:10

Wade summarized his discussion on values of television in education by stating "the capacity to record, store and play back information adds a flexibility at both the production and utilization ends of television that makes

it worth the trouble."[65:11]

There are some who feel that the cost of the equipment for video taping is too expensive for schools and colleges to purchase.[38:98] However, the writers cited previously feel that the values in the use of video tapes outweigh the cost. The initial cost of adequate equipment starts at about fifteen hundred dollars and rises depending upon the type of equipment and perfection desired. Tape costs range from thirty to seventy-five dollars depending upon the length. "A piece of tape can be used for over 100 different recording tasks."[65:10]

In summary, portable video tape recorders have been used effectively in teacher-training programs, guidance and counseling programs, Peace Corps training programs, coaching of athletic teams, and general self-evaluation programs. From the results obtained by Caine[70], Plese[85], and Hirsch[98] in using television video tape playback, it seems apparent that research needs to be done in the use of this medium in teaching motor skills. As so aptly stated by Allen we must always keep in mind that

> the key to the selection of the appropriate instructional media to use in any particular situation is

> the relative effectiveness of that medium in accomplishing the desired educational objective. 27:27

From the studies and articles cited in this review, justification is made for various types of aids to be used in the teaching-learning process. It should be noted, however, that "...the literature fails to reveal conclusive evidence that any one form of visual aid is more effective than another."[37:250] Glassow warns that "before we fully accept the theory that aids [speaking mainly of motion pictures] increase the amount of skill learned that ...additional experimental study should be made."[41:501]

On the basis of this review and the personal interest of the investigator, it was felt that the effectiveness of using television video instant playback should be investigated.

CHAPTER IV

PROCEDURE

PHASE I: PRELIMINARY PREPARATION

In order to conduct this study it was necessary for the investigator to become thoroughly familiar with the portable television video tape recording equipment since this device was to be used in the study. Therefore, the first part of the study began during the summer of 1967 with the video taping of women students enrolled in beginning golf classes at the University of North Carolina at Greensboro. During a five week period, information was obtained as to: the most efficient set-up and operation of the camera, deck and monitor; camera settings under various light conditions (both indoor and out); time necessary for video taping one student executing one pitch and run shot plus immediate playback for both teacher and student analysis.

During this time it was found that the technical equipment could be set up ready for use in fourteen minutes. This time included: adjusting the monitor and fine tuning in on a local television station; threading the tape through the recorder; setting the camera using the zoom lens, adjusting the footage and fine tuning for a clear

picture depending on the light conditions; and recording several feet of tape and playing it back to insure proper recording. The time required to tape one pitch and run swing (hitting a hard ball), rewinding and playing it back for teacher-student analysis was fifty-five seconds.

In taping a number of students and playing their performances back immediately for student-teacher analysis, it was ascertained that the one performance and the one time playback for each student was not sufficient. Students indicated that the first time they saw the playback they were looking at themselves (their clothing, hair style, etc.) rather than their performance of the pitch and run shot. Also, the one time playback was not long enough for student-teacher analysis.

It was then decided to tape three consective performances, and play back the three performances immediately three times in succession. The first playback was for the student to get used to seeing herself on tape and for teacher preparation in analyzing the three swings. The second playback was for pointing out faults (or errors) as well as good points by student and teacher. The third playback was for students to concentrate on points previously emphasized. Both student and teacher reactions indicated that this procedure was better than the previous

one performance and one time playback procedure.

In the fall of 1967, the above procedure (three performance-three immediate playbacks) was followed with a beginning golf class, composed of women students, at the University of North Carolina at Greensboro as a check on the feasibility of the plan to lecture, demonstrate, and video tape and playback the action of eighteen students during a fifty minute class period. It was found that the plan was feasible; therefore, it was decided that each student in a class, using the video tape, would hit three pitch and run shots, go immediately to the monitor and view her previous performances. Thus, a student would see each of the three swings just performed three times.

PHASE II: PILOT STUDY

A survey of the literature was made in an attempt to find a valid and reliable pitch and run test using a regulation golf green as the target area. Studies reviewed in which reference was made to skill testing in golf were: Feldt[39]; McKee[50]; Rehling[21]; Cochrane[71]; Clevett[32]; Coffey[72] Olsen[52]; Autrey[67]; Huckelbridge[79]; Reese[86]; Watts[93]; West and Thorpe[94]; Keth[83]; Brown[69]; Wood[95]; and Vanderhoof[91]. Only Cochrane, Clevett, Watts, and West and Thorpe mentioned a pitch and run shot. In each case the test was designed

for administration indoors with plastic balls or outdoors using a flat surface such as a playing field as the target area. Prior literature did not reveal a satisfactory pitch and run test for use in this study. However, suggestions made in some of the studies reviewed were useful in determining target size, scoring method, distance from the target, and number of trials needed in the construction of a pitch and run test for use in this study.

Designing the Test

The main intent in Phase II of the pilot study was to construct a test that would give an accurate indication of a student's ability to hit a pitch and run shot as close to the pin as possible (or to hole-out). To fulfill the initial intent, club selection had to be made, target size had to be determined, number of trials, distance from the pin, and methods of scoring had to be decided upon.

In construction of the test such factors as administrative feasibility as well as the skill level for which the test was being devised were taken into consideration. Since this test was to be used in a group golf instruction situation it was necessary to devise a test that could be given individually to a group of students in a given fifty minute class period. It was important too that the test be suitable for college women students who were beginners in learning to play golf.

A seven iron was selected for use in the test because the angle of the club head allows for both height and run which is desirable in a pitch and run shot. Also the experience of the investigator had indicated that most colleges and universities include a number seven iron in their equipment for teaching beginning golf.

It was felt that in order to get a true indication of accuracy, a regulation green was needed. The target area selected for use was a golf green as opposed to a hockey field or a similar flat area such as had been used in studies reviewed by the investigator. The target was a cup centered in the middle of a practice green. The cup was surrounded by fifteen concentric circles marked by ball markers which would not be visible to the subjects taking the test. The inner circle had a radius of one foot. The radius of each succeeding circle was increased by one foot. Therefore, the outer circle was thirty feet in diameter.

A restraining line, marked by tee markers, was located at a distance of seventy-five feet from the pin. A steel tape was stretched, parallel to the line of ball flight, from the restraining line to a distance of thirty-six feet toward the cup. White cards marked with green numbers were placed at yard intervals for easy determination of where the ball first hit the green.

Administration Of The Test

In order to determine if the test appeared to measure accuracy, to determine the arrangement of point values of the target area, to determine the distance from which the ball should be hit, to determine the number of trials needed, and to find out if the proposed test would discriminate between golfers' with various skill levels, it was decided to administer the test to subjects who were considered to be in one of the following skill level categories: advanced, intermediate, or beginning. The subjects selected were five advanced golfers, two intermediate golfers and four beginning golfers. The advanced golfers were women who had established handicaps ranging from seven to seventeen. Most of these advanced players had also played in some type of competitive or tournament situation. Those classified as intermediates were college women students who were enrolled in an intermediate golf class at the University of North Carolina at Greensboro having previously taken a beginning course in golf at the same institution. The beginning level subjects were students who were enrolled in a beginning golf class also at the University of North Carolina at Greensboro.

Each subject was given twenty trials. After each trial, a scorer-retriever noted where the ball came to rest, called out the distance in feet from the pin, and removed the ball from the target area. A scorer, standing opposite the seven yard card near the steel tape parallel to the

green, and facing the performer, recorded in yards where the ball first hit the green and the score in feet which was called out by the scorer-retriever. This procedure was followed throughout the twenty trials. See Appendix A for a photograph of the testing area.

A score card was designed to provide a record of where each ball first hit the green and where the ball ultimately came to rest. Therefore, after the twenty trials, numbers one through twenty would appear somewhere in the yardage column as well as in one of the circles if the ball came to rest within the thrity foot diameter. The number of the balls not scoring was placed in the space provided. For example, if ball number three first hit the green seven yards from the restraining line and came to rest ten feet short and to the right of the pin, the number three would appear under the seven in the yardage column and the number three would also appear in the right bottom quardant of the ten foot circle. A copy of the score card appears in Appendix B.

A score of sixteen was given for a hole-in-one. A score of fifteen was given to a ball that came to rest one foot from the cup, fourteen points for a ball coming to rest two feet from the cup, thirteen points for a ball coming to rest three feet from the cup and so fourth. A ball that came to rest outside of the thirty foot diameter did not score, nor did a missed ball; however, both were recorded as trials.

Evaluation of the Test

A total of two hundred and twenty shots were executed by the eleven subjects. Forty-five percent of the beginning skill level subjects' balls came to rest in the target area. Seventy-five percent of the intermediate skill level subjects' balls came to rest in the target area and seventy-eight percent of the advanced skill level subjects' balls came to rest in the target area. Sixty-nine percent of the beginners', sixty percent of the intermediates', and eighty-two percent of the advanced subjects' balls which scored first hit the green seven yards or beyond from the restraining line. On the basis of this information it was decided that the target area would remain as constructed and that only those balls first hitting the green at or beyond the seven yard mark from the restraining line would be scored.

To determine the reliability of the test the total score of the odd-numbered trials was correlated with those of the even-numbered trials. A correlation coefficient of .959 was found. To predict the reliability of the whole test, the Spearman-Brown Prophecy Formula was used. Using this formula, the reliability coefficient was found to be .979.

It was decided on the basis of overall consistency that to cut the number of trials in half would be taking a risk since most of the subjects did not appear to reach a leveling off point or plateau. Using the Spearman-Brown

Prophecy Formula the estimated reliability coefficient for fifteen trials was .947. Therefore, on the basis of this information it was decided that fifteen trials would be used in subsequent testing since fifteen trials would allow for greater ease in administration in a fifty minute class period.

Bolstad, Griffin and Rotvig define the pitch and run shot as an approach shot "...which travel [s] through the air over the fairway grass and land [s] on the green with enough roll to get it within good putting distance of the cup."[4:60] Since the test required the ball to travel in the air at least seven yards, to land on the green, and placed a premium on rolling the ball into or close to the cup, it was felt that the test could be accepted at face validity.

The ability of the test to differentiate between levels of ability was a second aspect considered in evaluating the validity of the test. On the basis of the data obtained from the three skill levels mentioned previously, the t-test of significances of difference between means of the beginning and advanced skill levels was used to determine if the test did differentiate between the levels.

The investigator was interested, further, in determining the degree of relationship between form while executing the pitch and run shot and the accuracy score as another indication of possible test validity. Subjects used to determine this relationship were thirty-nine students who were enrolled in beginning golf classes at the University

of North Carolina at Greensboro in the first semester of the school year 1967-68. These thirty-nine subjects elected to enroll in an intermediate golf class in the spring semester and were tested on the first day of that class meeting. A copy of the letter requesting permission to use these subjects and the request sheet enclosed in the letter may be found in Appendix C.

Movies were taken of each subject's fifth, tenth, and fifteenth swings. The movies were made in color with a Bell and Howell 8 millimeter camera at a speed of sixteen frames per second. A grid was placed behind the subject. A number posted on the grid was changed for each subject. Later, these numbers were used by judges to identify each of the subjects as they rated performance of the pitch and run shot.

Three judges were selected to rate the form of the subjects. These judges were all golf teachers at the University of North Carolina at Greensboro and were considered to be competent judges on the basis of their previous experiences in teaching golf. See Appendix D for an identification of the judges.

The judges met with the investigator and went over the rating scale to be used for judging form. Suggestions and revisions in the rating scale were made. The final form of the scale, as used by the judges, appears in Appendix B.

CONSTRUCTION OF THE LOOP FILM

One of the treatment effects in the experimental phase of the study was to involve loop film viewing of the pitch and run shot. This necessitated construction of such a film.

Eight millimeter slow motion (48 frames per second) and regular speed (16 frames per second) color motion pictures (using an 8mm Bell and Howell Camera) of the investigator executing the pitch and run shot were made prior to the study. The investigator attempted to execute the shot just as it would be demonstrated for Groups I, II, and III in the study.

Using a number seven iron, action shots were made at different angles: front view, facing the subject at a ninety degree angle from the line of flight; non-target side view; and target side view. A grid was placed back of the subject. Movies were taken in slow motion and at regular speed from each angle. In addition a close-up of the grip, stance, ball placement, and the swing were filmed. The film was edited and cut by the investigator selecting the best executions of the shot at different angles. Portions of the film selected for inclusion in the loop film were:

1 regular speed, front angle, full view of execution.

1 slow motion, front angle, full view of execution.

1 slow motion, front angle, close-up view of the grip, stance, ball placement and swing.

1 regular speed, target side angle, full view of execution following the path of the ball until

it came to rest near the cup.

In viewing the above sequence for three minutes, the four shots could be seen three times each.

The film was temporarily spliced together and sent to School Supplies in Raleigh, North Carolina to be put into a Technicolor Magi-Cartridge. The Cartridge was made to be used in a Technicolor 800 Instant Movie Projector with a Technor F/1.5 9.5-15mm Zoom Projector Lens.

INSTRUMENTATION

Television Video Tape Recording Equipment

Three of the four groups in the study involved the recording of student performances in the pitch and run shot and immediate playback of the performances. The instruments used for this purpose were manufactured by the Sony Corporation, Tokyo, Japan and distributed by the Sony Corporation of America. The following equipment was used.

1. Video Camera Kit VCK-2000A. Items contained in the kit used in the study were; Video Camera CVC-2000; Telephoto Lens (F1.9, 75MM); Camera Cable CCF-5; AC Power Cord; and an Elevator Tripod VCT-20.
2. Videocorder, Model CV-2000. The operation is similar to that of an ordinary tape recorder. The Videocorder records picture and sound on a one-half inch wide tape and its unique

feature is that of playing back both sound and picture immediately after recording.

3. TV Monitor DVM-51UWP. The monitor possesses the normal function of a regular television receiver. In addition it supplies sound and picture to the Videocorder and displays both picture and sound while recording, as well as playback of previously recorded material.
4. Video Tape V-32. A Sony Video Tape, one-half inch tape on a seven inch reel, with one hour playing time was used. The Video Tape V-32 was erased and re-used each day of the study.

Photographs of the equipment are shown in Appendix A.

Projection Equipment

A Kodak Chevron 8 Projector, Model 10 with a Projection Zoom Lens 15-25MM F/1.2 was used by the judges in viewing the films of subjects performing the pitch and run shot. The projector is equipped with regular and slow-motion speed, still picture, and reverse in regular speed.

A Technicolor 800 Instant Movie Projector with a Technor F/1.5 9.5-15MM Zoom Projector Lens was used by the subjects when viewing the loop film. This projector is equipped with regular speed and stop action. Only regular speed was used by the subjects when viewing the loop film.

PHASE III: THE STUDY

The problem of this study was to determine the effectiveness of using television video tape instant playback, in learning the pitch and run shot in golf. Four teaching methods were devised for comparative purposes.

Selection of Subjects

A letter (see Appendix C) was sent to all golf teachers at the University of North Carolina at Greensboro requesting a meeting to discuss the purpose and plans for the study and to ask permission to use their golf classes if included in the random selection. At the meeting all golf teachers indicated their willingness to have their classes participate in the study if selected. From talking with these golf teachers and from the investigator's own experience in teaching golf, it was decided that a total of four class periods would be sufficient time for teaching-learning the pitch and run shot in golf.

Four classes were randomly selected. One class met on Monday and Wednesday from 10 a.m. until 11 a.m. The other three classes met on Tuesday and Thursday from 10 to 11 a.m., 2 to 3 p.m., and 3 to 4 p.m. Sixty-nine college women students who had elected to take beginning golf at the University of North Carolina at Greensboro in the Spring Semester of the school year 1967-68 were enrolled in these four classes.

A letter (see Appendix C) was sent to the golf teachers

whose classes would be involved in the study to inform them of the procedure to be followed. The teachers were informed when the study would start and end. The teachers of the four classes selected were asked not to teach the pitch and run shot prior to the study - not even to mention the name "pitch and run" to their classes. The investigator received full cooperation in this respect.

Conduct of the Experiment

On February twenty-first and twenty-second, 1968, the investigator attended each of the four classes to be included in the study and informed the students of the procedure to be followed for the next two and a half weeks. Each class was given identical information as to the purpose of the study, but they were not informed as to the method that would be used in their particular class. Students were asked if they had had any previous golf instruction or if they had played golf. All students indicated no previous instruction or playing experience. The age of each student was ascertained at this time. Attendance was stressed as being important to the study as well as to students for improving their skill so that they would ultimately be able to enjoy playing the game of golf. Classes consisted of between fifteen and eighteen students.

The Department of Health and Physical Education at the University of North Carolina at Greensboro administers the Scott General Motor Ability to all students. Results,

converted to T-Scores, from this test were gathered for each student in the four classes. Thus, an attempt was made to equate the groups on the basis of the Scott Motor Ability Test scores, age range, and no previous golf experience.

Each class had met a total of six class periods prior to the study. Each class had received instruction in how to hold the club, mechanics of a full swing and limited putting practice. Therefore, it was established that none of the four classes had heard of or practiced the pitch and run shot prior to the study.

The investigator served as instructor to all four classes. Video tape recording and playback was done by a graduate student-technician who was proficient in the use of the equipment. The regular class teacher was not present for the duration of the study.

The method of instruction assigned to each class was determined by using a table of random numbers. The traditional Teaching Method was assigned to the Monday and Wednesday (10 a.m.) class, hereafter referred to as Group I. The Tuesday and Thursday (10 a.m.) class was assigned the Traditional Teaching Method plus Student-Teacher Analysis of Taped Performance, hereafter referred to as Group II. The Tuesday and Thursday (3 p.m.) class was assigned the Traditional Teaching Method plus Student Analysis of Taped Performance, hereafter referred to as Group III. The Tuesday and Thursday (2 p.m.) class was assigned Loop Film

Viewing of the Pitch and Run plus Student Analysis of Taped Performance, hereafter referred to as Group IV. The objective for all four groups was the same - to pitch and run the ball as close to the cup (or hole-out) as possible. Only the method of presentation was different.

During the first class meeting, the first part of the period was spent in organization. An example of the organization used and a picture of the practice area can be seen in Appendix A. Group I received a brief lecture as to the purpose of the pitch and run shot followed by a demonstration at the hard ball practice area with discussion and suggestions for points to concentrate on during that class period. This was followed by practice by all with the investigator giving individual help to members of the class as each hit three hard balls after which they went to the plastic ball area for practice.

Group II received, on the first day, the same pattern of organization, lecture, and demonstration, except for the individual help at the hard ball area. After the demonstration, students went to their respective stations. At this time some were instructed to stay at the hard ball area and be video taped during the hitting of three hard balls. After the three hits the subject came immediately to the monitor at which time the three hits were played back for viewing by the student and investigator. Neither the student or investigator commented during the first

playback. During the second playback the investigator pointed out good points as well as faults. The student was encouraged to contribute her analysis also. During the third playback the student was instructed to look for points that had just been emphasized. After the third playback, the teacher and student went to a nearby mat to further reinforce what was just seen on the tape while the video technician was taping another student. When the second student had been taped she came immediately to the monitor, the teacher returned to follow the same sequence with that student. The first student then went to her assigned mat, established at the beginning of the class period, for plastic ball practice.

Group III received instruction identical to Groups I, and II regarding the organization, lecture, and demonstration. Subjects in Group III were video taped as were those in Group II; however, the student looked at the video playback and analyzed her swing without the aid of the investigator. The investigator gave individual instruction in the plastic ball practice area for the remainder of the period.

Group IV was given instruction as to the class organization and the aim of a pitch and run shot. They were told that the objective of this shot was to get the ball as close to the cup (or hole-out) as possible. The loop film, prepared by the investigator, which showed the investigator performing the pitch and run shot identical to the demonstration given the other groups was viewed by the whole class

for three minutes. Students then went either to their practice mat or to be video taped. Students analyzed their own swing at the monitor without the aid of the investigator. This type of organization was followed throughout the remainder of the period and subsequent class periods during the study. Students were told that they were free to go and review the loop film at any time during the class period.

Lesson plans used for the four groups for the four instructional periods may be found in Appendix E.

During the fifth class period, Group I was given the previously constructed pitch and run test for accuracy. Groups II, III, and IV were tested on the sixth class period due to inclement weather during the fifth class period. During the fifth class period, these three groups were not allowed to practice, not even hold a golf club. Their regular teacher talked with them about etiquette and rules of golf, therefore they received no additional instruction or practice.

Not all students enrolled in the four classes were used in the treatment of the data even though all students were taught and tested. Students who missed one or more of the five periods, students for whom motor ability scores could not be located, and students who were out of the age range (18-21) were excluded in the final analysis of the data. Data for the one male student enrolled in one of the classes was also eliminated. After scores were deleted for the

above mentioned reasons, Group I consisted of ten subjects, Group II, III, and IV had nine subjects each.

Treatment of Data

Pearson product-moment correlation coefficients, computed from the raw score formula, were calculated to determine the pitch and run test reliability, validity (using form as a criterion) and the degree of relationship between judges' ratings.

The four groups were equated on the basis of no previous golf instruction or experience in playing golf, age range (18-21), sex, and the fact that all subjects elected to enroll in a beginning golf class. In addition, the Scott General Motor Ability Test scores were treated statistically using analysis of variance, to determine if there were differences in general motor ability between the groups. "Analysis of variance procedures allows one to test for significance of differences among several groups at one time."[25:384]

The statistical technique to determine if there were differences in groups at the end of the study as assessed by the scores on the pitch and run test was analysis of variance.[25:384]

CHAPTER V

PRESENTATION AND INTERPRETATION OF DATA

The purpose of this study was to determine the effectiveness of using television instant playback, in learning the pitch and run shot in golf. Four different teaching methods, three of which involved the use of television instant playback, were devised for comparative purposes. The four methods of instruction are described below.

Group I: Traditional Method. A method in which subjects received lecture, demonstration and practice in the pitch and run shot.

Group II: Traditional Method plus Student-Teacher Analysis of Taped Performance. A method in which, in addition to the traditional method of instruction, each subject's performances were video taped and played back immediately for analysis by both student and teacher.

Group III: Traditional Method plus Student Analysis of Taped Performance. A method in which, in addition to the traditional method of instruction, each subject's performances were video taped and played back immediately for analysis by student only.

Group IV: Loop Film plus Student Analysis of Taped Performance. A method in which subjects

viewed a loop film of the investigator executing the pitch and run shot for three minutes each period in addition to student analysis of taped performances of themselves executing the pitch and run shot.

Literature reviewed did not reveal a valid and reliable pitch and run test; therefore, it was necessary to construct an instrument to evaluate ability to execute a pitch and run shot.

The presentation and interpretation of data is divided into two parts. Part I deals with the construction of the pitch and run test. Part II deals with the null hypothesis of no difference between effectiveness of methods of instruction with or without the use of television video tape instant playback in teaching the pitch and run shot.

PART I

CONSTRUCTION OF TEST

Test Reliability

To provide an accurate estimate of accuracy in executing a pitch and run shot a reliable and valid test was needed. Subjects used for establishing the initial reliability of the test were five advanced golfers (with established handicaps ranging from seven to seventeen), two intermediate golfers who were enrolled in intermediate golf classes at

the University of North Carolina at Greensboro, and four beginning golfers who were enrolled in a beginning golf class at the same institution.

The pitch and run test, described in the pilot study section of the procedure chapter, was administered to these eleven subjects. To determine if the test would consistently yield the same results when repeated by the same group of subjects under the same conditions, the total of the odd-numbered trials was correlated with the total of the even-numbered trials. A correlation coefficient of .96 was found using this statistical technique. To predict the reliability of a twenty trial test the Spearman-Brown Prophecy Formula was used. An estimated correlation coefficient of .98 was obtained. To estimate what the reliability of fifteen trials would be the Spearman-Brown Formula was reapplied. The result was a correlation of .97. The reliability coefficients for twenty, ten, and fifteen trials are presented in Table I. The raw scores used in establishing the reliability coefficient are presented in Appendix F.

In order to be able to administer the test to eighteen subjects in a fifty minute class period and since the subjects scores did not reach a leveling off point or plateau, it was decided to use fifteen trials in the test. From the results of the predicted reliability coefficient of .97 for fifteen trials, it seemed that fifteen trials would be sufficient in predicting accuracy on the pitch and run shot.

TABLE I

PILOT STUDY RELIABILITY COEFFICIENTS FOR THE PITCH AND RUN TEST USING THE ODD-EVEN METHOD AND APPLYING THE SPEARMAN-BROWN PROPHECY FORMULA

N = 11

	r
Odd-Even	
10 trials vs 10 trials	.96
x .5 (5 trials)	.92
x 1 (10 trials)	.96
x 1.5 (15 trials)	.97
x 2 (20 trials)	.98

Since subjects used for estimating the reliability of the test involved three skill levels executing twenty trials, it was decided to use the scores made by the four groups in the study itself as a check to see if the test would consistently yield the same results when fifteen trials were executed by beginning golfers. An uneven number of trials was used with this group. For this reason the total of the five odd-numbered trials was correlated with the total of the five even-numbered trials of the first ten

trials. A correlation coefficeint of .62 was found on the basis of these data. To estimate what the reliability of a fifteen trial test would be the Spearman-Brown Prophecy Formula was used. A correlation coefficient of .83 was obtained. Table II shows correlation coefficients for five, ten and fifteen trials. Appendix F contains the raw scores which were used in determining the reliability coefficient.

TABLE II

RELIABILITY COEFFICIENTS FOR THE PITCH AND RUN TEST USING THE ODD-EVEN METHOD AND APPLYING THE SPEARMAN-BROWN PROPHECY FORMULA

N = 37 Beginning Golfers

	r
Odd-Even	
5 trials vs 5 trials	.62
x 1 (5 trials)	.62
x 2 (10 trials)	.77
x 3 (15 trials)	.83

According to Barrow and McGee[2:42] a correlation

coefficient of .95 to .98 is considered to be an excellent standard for judging the reliability of a test and an obtained correlation coefficient of .80 to .84 is considered to be an acceptable standard. Therefore, on the bases of results obtained in both testing situations, it was decided that the pitch and run test as constructed (using 15 trials) is a reliable test for measuring accuracy in the pitch and run shot.

Test Validity

The pitch and run shot has been defined as an approach shot used when the ball is "...no more than 100 yards from the green."[12:196] "...which travel[s] through the air over the fairway grass and land[s] on the green with enough roll to get it within good putting distance of the cup."[4:60] The pitch and run test was so designed that the total distance from hitting point to cup was less than a hundred yards; the ball had to travel in the air at least seven yards from the restraining line; the ball had to land on the green; and the ball, in order to score, had to come to rest within the target area (which is 'good putting distance'). To achieve the desired result the club was choked, the stance was narrow and a short swing was used to produce a lofted ball and roll following landing on the green. Thus, the pitch and run test can be considered a valid measurement on the basis of face validity. One method of establishing

validity, according to Barrow and McGee, is "...on the basis of logic, common sense, judgement...that is to say that one can look at a test and see inherently what it is measuring." [2:42] Also, as stated by Cureton, "a test is face-valid if it looks valid." [17:672]

The ability of the test to differentiate between levels of ability was a second aspect considered in evaluating the validity of the test. As described previously, the test was administered to five advanced, two intermediate and four beginning skill level golfers. The statistical method used to determine if there were differences among the extreme skill levels (beginning and advanced) was Fisher's t test of significance for small uncorrelated groups. The means, standard deviations, and the obtained t value are presented in Table III.

TABLE III

MEANS, STANDARD DEVIATIONS, AND t-RATIO FOR SUBJECTS OF DIFFERENT SKILL LEVELS IN EXECUTING THE PITCH AND RUN SHOT

Skill Level	N	SD	MEAN	t
Beginning	4	11.86	61.5	3.29*
Advanced	5	39.08	137.2	

t_{05} (7df) = 2.365

*Significant at the 5% level of confidence

The required t value for significance at the five percent level of confidence for seven degrees of freedom is 2.365. A t of 3.29 was obtained, when the beginning and advanced skill level groups were compared. A t of that value indicates a statistically significant difference between the scores made by beginners and advanced golfers on the pitch and run test. On the basis of these data, it was concluded that the test does indeed differentiate between the beginning and advanced skill levels used in this study.

A third aspect of test validity investigated was the relationship between test scores and the average of subjective rating of form by three competent judges. Thirty-nine students who were enrolled in beginning golf classes at the University of North Carolina at Greensboro were given the pitch and run test. Motion pictures of each subject's fifth, tenth, and fifteenth swings were made. Judges rated the form of these three performances. The average rating of the judges' scores were then correlated with the test scores. The judges evaluated on the basis of a rating scale (see Appendix B) which carefully defined the points to be rated. Raw data for judges' rating and test scores are presented in Appendix F. These data yielded a validity coefficient of .24. The low validity correlation indicated no more than a chance relationship between accuracy results and form as rated by the three judges. One possible explanation for the low validity coefficient is that

there may in reality be little relationship between form as rated by the judges and accuracy results in executing the pitch and run shot.

Intercorrelations of judges' ratings were computed to determine the degree of relationship among the judges' ratings of form. Table IV shows the intercorrelation coefficients of judges' ratings. Judge I and II had a correlation coefficient of .35, Judge I and IIIa correlation

TABLE IV

JUDGES INTERCORRELATI ON COEFFICIENTS

N - 39

Judges	r
I vs II	.35
I vs III	.40
II vs III	.72

r_{05} (35df) = .325

coefficient of .40 and Judge II and III a correlation coefficient of .72. Although low, all of the correlation coefficients were statistically significant at five percent level of confidence. The low intercorrelation coefficients between judges' ratings indicated that the judges were either not in agreement with the standards that were set up in the rating scale or with each other as to what constitutes

good form in executing the pitch and run shot. It is possible that lack of agreement among the judges was a factor in the low validity coefficient obtained.

Even though the validity coefficient obtained when using judges' ratings of form with accuracy results was low, the investigator accepted the test as being valid because of the results of the skill level differentiation and on the basis of face validity since the subjects attempted to loft the ball and have it run toward the cup which is the objective in the pitch and run shot.

PART II

THE STUDY

Statement of Hypotheses

The following two sets of null hypotheses were formulated and tested with the five percent level of confidence established as the coefficient of risk.

Set I - With respect to motor ability, there is no difference between Groups:

a. I and II

b. I and III

c. I and IV

d. II and III

e. II and IV

f. III and IV

Set 2 - With respect to ability to execute the pitch and run shot in golf, there is no difference between the effectiveness of methods of instruction with or without the use of television video tape instant playback between Groups:

a. I and II

b. I and III

c. I and IV

d. II and III

e. II and IV

f. III and IV

Equating Groups

The four groups used were equated on the basis of:

1) no previous golf instruction or playing experience,
2) the Scott General Motor Ability Test,
3) age range,
4) sex, and
5) the fact that all subjects elected to enroll in a beginning golf class.

Prior to the study subjects were asked about previous golf instruction or playing experience and all indicated no experience or instruction prior to enrolling in the beginning golf class. Only those subjects for whom T-Scores for the Scott General Motor Ability Test could be obtained, those whose ages ranged from eighteen to twenty-one, and only college women were used as subjects. For analysis purposes

the analysis of variance technique was used to compare the means of the general motor ability, assessed by the Scott Test, of the four groups of subjects. These data are presented in Table V.

TABLE V

MEANS, STANDARD DEVIATIONS AND ANALYSIS OF VARIANCE OF MOTOR ABILITY SCORES OF THE FOUR EXPERIMENTAL GROUPS

GROUPS	N	RANGE	MEAN	SD
I	10	39-70	56.8	9.61
II	9	42-75	56.6	10.66
III	9	48-66	53.9	5.46
IV	9	41-64	55.7	6.78

Analysis of Variance

Sources of Variation	SS	df	MS	F
Between Groups	49.58	3	16.52	.207
Within Groups	2630.1	33	79.7	
Totals	2679.68	36		

$F_{05}(3,33df) = 8.61$

Subjects in Group I had motor ability T-scores ranging from 39 to 70 with a mean of 56.8 and a standard deviation of 9.61. Group II subjects had T-scores ranging from 42 to 75 with a mean of 56.6 and a standard deviation of 10.66. The range of T-scores for Group III was from 48 to 66 with

the mean T-score 53.9 and the standard deviation of 5.46. The scores for Group IV range from 41 to 64 with the mean being 55.7 and the standard deviation being 6.78. The means for the four groups ranged from 53.9 to 56.8. The obtained value of F from the analysis of variance was .21. A value of 8.61 was needed to reject the null hypothesis at the five percent level of confidence. Thus, it was concluded that there were no significant differences between any of the group combinations on the basis of motor ability scores as well as no measurable differences in the other variables mentioned.

Methods of Instruction

The measurements used to determine if there were differences in effectiveness of the four methods of instruction involving video tape instant replay were the pitch and run scores (see Appendix F for raw data) made by the four groups of subjects after four instructional periods. Although the number of students participating in the study numbered sixty-nine, the scores for only thrity-seven subjects were treated statistically. Students were deleted from the study for the following reasons: absence from one or more instructional periods or the testing session; lack of a general motor ability score; age (several older women were enrolled in the classes). The scores of the one male student enrolled were also deleted to eliminate sex

as a potential barrier. After the deletions, Group I included ten subjects; Groups II, III, and IV consisted of nine subjects each. The statistical technique used to determine if there were differences in scores made on the pitch and run shot by groups regardless of teaching method used was analysis of variance. This technique was selected because it allows "...one to test for significance of differences among several groups at one time."[25:384] The null hypothesis of no difference between groups was tested at the five percent level of confidence.

A summary table of the analysis of variance comparison of the four groups in the pitch and run test scores is presented in Table VI. The data revealed that there were no significant differences among the four groups. Therefore, it can be concluded that variations in methods of teaching the pitch and run shot did not result in performance differences.

Although there were no significant differences found among the four groups, there is reason to believe that weather conditions during the testing sessions might have had an effect on the test results. The testing conditions were ideal for Group I in that the temperature was in the high sixties on a bright sunny day. The subjects came at staggered times so that there would be no appreciable waiting period before being tested. The weather conditions for Group II were far from ideal in that the temperature was in the mid thirties during the testing period.

TABLE VI

MEANS, STANDARD DEVIATIONS AND ANALYSIS OF VARIANCE OF THE PITCH AND RUN TEST SCORES OF THE FOUR EXPERIMENTAL GROUPS

GROUPS	N	RANGE	MEAN	SD
I	10	0-63	23.8	19.80
II	9	9-94	41.8	27.59
III	9	0-92	30.6	26.7
IV	9	2-83	34.9	24.15

Analysis of Variance

Sources of Variation	SS	df	MS	F
Between Groups	1616.9633	3	538.9877	.7923
Within Groups	22448.28	33	680.25	
Total	24065.2433	36		

F_{05} (3,33df) = 8.61

The low temperature caused the students to wear heavier, bulkier clothing which may have restricted their movement. The green was frozen as was the hitting area during this testing session. Thus, Group II had to make adjustments which the other groups did not have to make.

For the afternoon sessions, Groups III and IV, the temperature was in the low fifties and the sun was shining brightly. The testing area was partially protected by a high bank on one side of the green and the gymnasium on the other so that the actual area for testing seemed warmer than the temperature indicated. It is possible that weather was a factor in obtaining no statistical differences among the four groups as assessed by the pitch and run test.

Even though the findings reached in the study itself showed no statistical differences in methods of instruction, it seems apparent, based on student comments as well as observations made by the investigator that the use of television video tape instant playback has a great deal to offer in teaching the pitch and run shot in golf as well as other motor skills.

During the four instructional periods, the investigator was cognizant of comments made by students during the video taping of performances and playback viewing. Some of the comments were made directly to the investigator, some to fellow students, and some were made as if the students were talking to themselves. Several of the comments were written

down after each class and are included here.

Group II comments-

To Instructor:

"I see now what you meant when you talked of firm wrists through the hitting area." "I'm still doing what you told me not to do last time." "It helps when you don't say anything during the first and last viewing."

To Fellow Student:

"My stance was as wide as Miss Smith [investigator] said." "I didn't believe I was swaying until I saw it on tape."

To Self:

"I look so stiff." "I need to lose weight." "At least I have corrected last class period's mistake."

Group III Comments -

To Instructor:

"I saw on the tape what you were talking about - I do break my wrists at impact."

To Fellow Student:

"I don't know exactly what to look for on the tape." After three days of video taping performances, "The only thing I saw differently today was that I had on a different sweater and skirt." "I'm not following through as I should."

To Self:

"I can't believe I am seeing what the teacher sees in me- no wonder she keeps after me to do this or try something else."

Group IV Comments-

To Instructor:

"Are you ever going to tell us how to do the pitch and run shot?" "I can see from the tape that I am not doing what is on the loop film." "This is great, for the first time in my life I am totally free to figure out how to do something on my own."

To Fellow Student:

"Can you see what I am doing wrong?" "I see more in the loop film than I did last time.- I think I improved today - at least I got the ball in the air today."

To Self:

"My left arm is so crooked." "My feet aren't even pointing in the right direction."

The investigator also questioned the groups using the video tape instant playback as to how they felt concerning the use of this device as an aid to instruction. The questions were not structured, the atmoshphere was very informal, thus it was felt that answers were an indication of how students truly felt. The following discussion reveals the outcome of the informal questioning.

It was felt that the video tape equipment could best be used by having the students practice the skill to be learned, then have performances taped and analyzed by both student and teacher. This seemed to have been the general feeling of the groups using video tape. However, there were some who felt that self-analysis was the exciting aspect while viewing the taped performances three times. In regard to viewing the performances three times, it was felt that this procedure was good. Students indicated that they were looking at the overall swing pattern the first time through, analyzing the second time through, and concentrating on points seen the third time through. All the students as well as the investigator felt that the use of television video tape instant playback was an excellent motivational device.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The purpose of this study was to determine the effectiveness of using television video tape instant playback in learning the pitch and run shot in golf. The effectiveness of four different teaching methods (traditional; traditional plus student-teacher analysis of taped performance; traditional plus student analysis of taped performance; and loop film plus student analysis of taped performance) was compared. Prior to the study itself, a pitch and run shot test was constructed to be used in assessing a golfers' ability in executing a pitch and run shot.

Test Construction

Five advanced, two intermediate and four beginning golfers were administered a pitch and run test constructed by the investigator. Analysis of data revealed that the test was highly reliable ($r = .97$). A further check was made using the subjects in the study itself, thirty-seven beginning golfers, and again the test was found to be a reliable measure of the pitch and run shot ($r = .83$).

The test was accepted as a valid measure since it requires the students to loft the ball and run it toward the cup which is the objective of a pitch and run shot. Using

the data from the diverse skill level performers mentioned above, it was found that the test did discriminate between advanced and beginning skill levels. On the basis of these two criteria the test was accepted as a valid measure of the ability to execute a pitch and run shot. A further validity check was made by correlating the average form rating of three competent judges with the scores made by thirty-nine college women students enrolled in beginning golf classes at the University of North Carolina at Greensboro. Data revealed no more than a chance relationship between form and accuracy in executing the pitch and run shot.

Experimental Study

The population studied were thirty-seven undergraduate college women students who elected to enroll in four beginning golf classes at the University of North Carolina at Greensboro. Subjects in the study were equated on the basis of: no previous instruction in the pitch and run shot or golf playing experience; sex; age (range of eighteen to twenty-one years); and general motor ability scores as assessed by the Scott General Motor Ability Test.

Each class met twice weekly for a period of fifty minutes each. The duration of the study was four instructional periods followed by a testing period. The investigator administered all instruction and testing. A table of random numbers was used to assign treatment variables to the four

groups. Group I received traditional instruction while Group II received traditional instruction in addition to student-teacher analysis of video taped performances. Group III also received traditional instruction plus student analysis of taped performances. Group IV viewed a loop film, constructed by the investigator, of the investigator executing the pitch and run shot just as it was demonstrated to Groups I, II, and III in addition to student analysis of taped performances.

After the four instructional periods, the pitch and run test was administered to the four groups. The test results were treated statistically by the analysis of variance technique. No significant differences among the four groups were revealed. Therefore, it was concluded that within the limitations of this study there was no difference in the effectiveness of the four instructional methods used in this study in teaching the pitch and run shot to the population studied.

Although there were no significant differences found among the four groups, there is reason to believe that weather conditions during the testing sessions might have had an effect on the test results. The traditional group had ideal weather conditions. The weather was far from ideal during the testing sessions for the three groups instructed with the aid of video tape instant playback. Thus, it is possible that weather was a psychological factor

influencing results.

The data agree basically with results obtained by Caine[70] and Hirsch.[98] Both Caine and Hirsch indicated that television video tape instant playback has a great deal to offer in the teaching-learning process which concurs with the observation made by this investigator.

The results of this study confirmed one finding of previous studies involving the use of filmed aids[81, 55, 92, 96, 42, 64, 75, 30, 90] in that the students were of the opinion that the films had been helpful to them.

The finding that the group receiving instruction via loop films was as good as groups receiving other instructional methods was supported by the results obtained by Murin, Hays, and Harley[64], Nelson[51], Karsner[81], and Gray and Brumbach.[42] Also, the data from this study concurred with Kern's conclusion that "...learning rate parallels very closely whether done with or without visual aids."[82:24]

Based on comments made by the students and observations made by the investigator, it was apparent that television video tape instant playback contributed to the interest, attention, and motivation in students learning the pitch and run shot.

CONCLUSIONS

Based upon the results of statistical analysis of data and within the limitations of the population studied and design used in this study, the following conclusions would appear to be justified.

1. Reliability coefficients which varied from .83 to .97 indicated that the pitch and run test constructed was a reliable measuring instrument.
2. The groups used in the experimental phase of the study were alike with respect to previous experience and instruction in golf, age, sex and motor ability.
3. With respect to the four methods of instruction used in teaching the pitch and run shot, there was no statistical difference between the effectiveness of:
   a. Traditional instruction and traditional instruction plus student-teacher analysis of taped performance.
   b. Traditional instructional and traditional instruction plus student analysis of taped performance.
   c. Traditional instruction and viewing of loop film plus student analysis of taped performance.
   d. Traditional instruction plus student-teacher analysis of taped performance and traditional instruction plus student analysis of taped performance.

e. Traditional instruction plus student-teacher analysis of taped performance and loop film viewing plus student analysis of taped performance.

f. Traditional instruction plus student analysis of taped performance and loop film viewing plus student analysis of taped performance.

4. Students indicated that they had a better understanding of the pitch and run shot after having viewed their own performances on the video tape.

RECOMMENDATIONS

The following recommendations are based on observations made by the investigator while conducting the study and conclusions drawn from the data presented.

Even though no statistical differences were found among the four teaching methods in this study, there is reason to believe that the proper use of the video tape instant playback has a great deal to offer in the teaching-learning process. It is for this reason that the following suggestions for further study are made.

1. A similar study should be conducted using a greater number of students in each group.
2. A similar study should be done using skilled golfers or golfers beyond the beginning level of playing ability to determine if the use of video tape instant

playback is more beneficial at a higher skill level.

3. Investigations should be made using video tape instant playback in other physical education activities.
4. A study should be formulated to determine the possible motivational contribution made by the use of video tape playback.
5. A study should be designed to investiage what effect immediate knowledge of results has on the learning of a motor skill.
6. It is recommended that a study be designed for a longer period of time with the video tape playback being used at various intervals to determine at what point in the learning process the video tape playback is most beneficial.
7. An effort might be made to refine the pitch and run test regarding judges form ratings with test results.
8. A study should be designed using video tape equipment with stop action, color, and slow-motion features to determine if these features enhance learning.

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APPENDIX A

PICTORIAL ILLUSTRATIONS

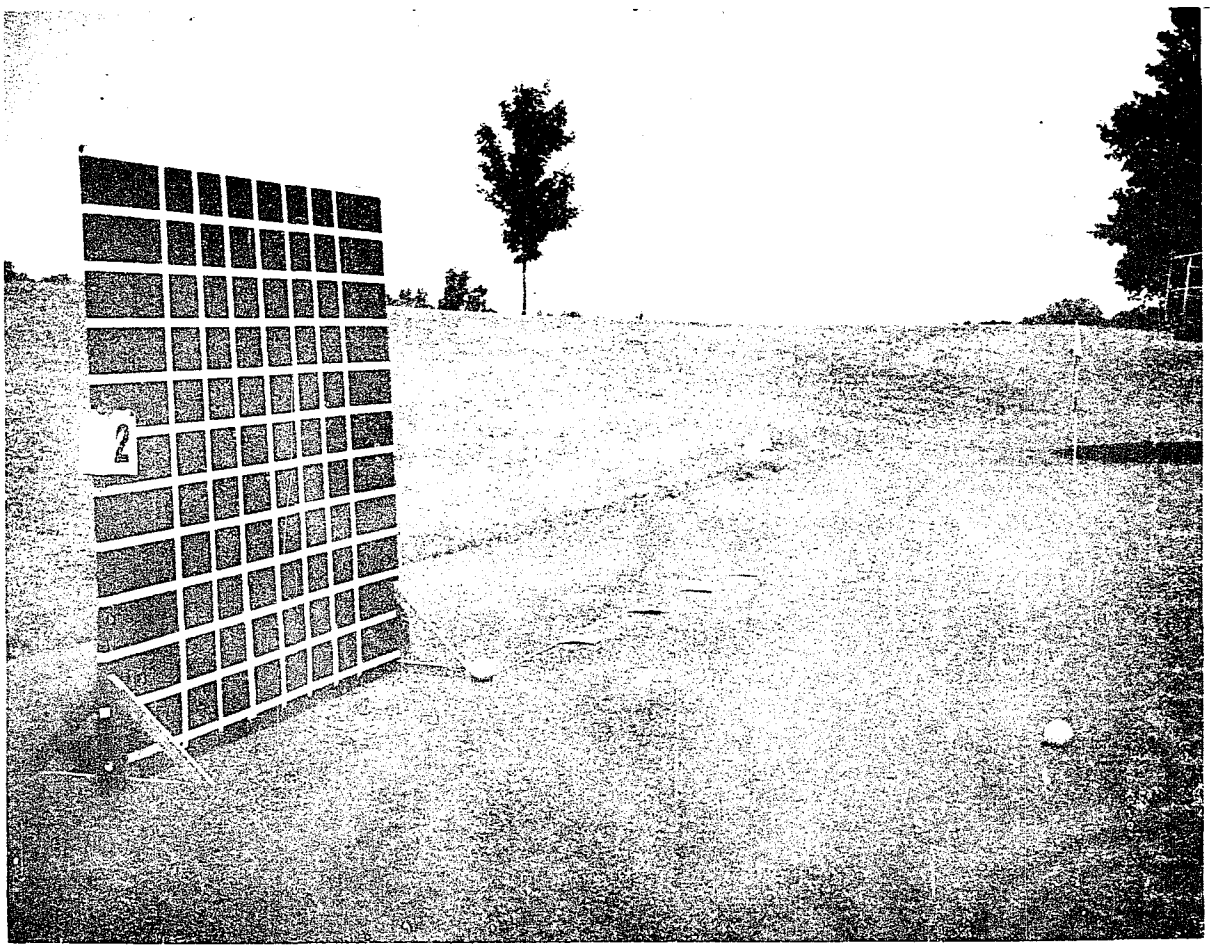


FIGURE 1

PICTORIAL ILLUSTRATION OF THE TESTING AREA

FIGURE 2

PICTORIAL ILLUSTRATION OF THE VIDEO TAPING EQUIPMENT

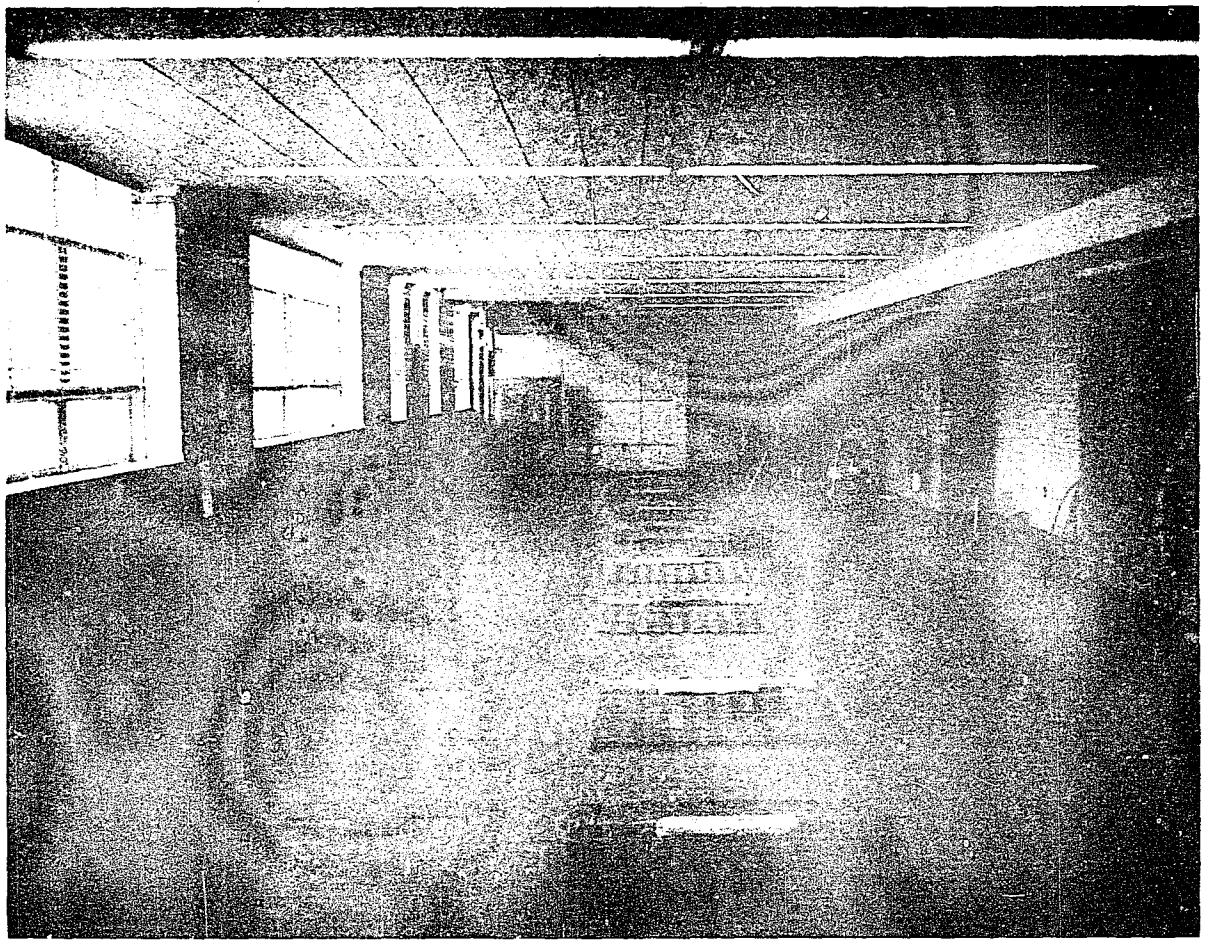


FIGURE 3

PICTORIAL ILLUSTRATION OF INDOOR PRACTICE AREA
AND VIDEO TAPE EQUIPMENT

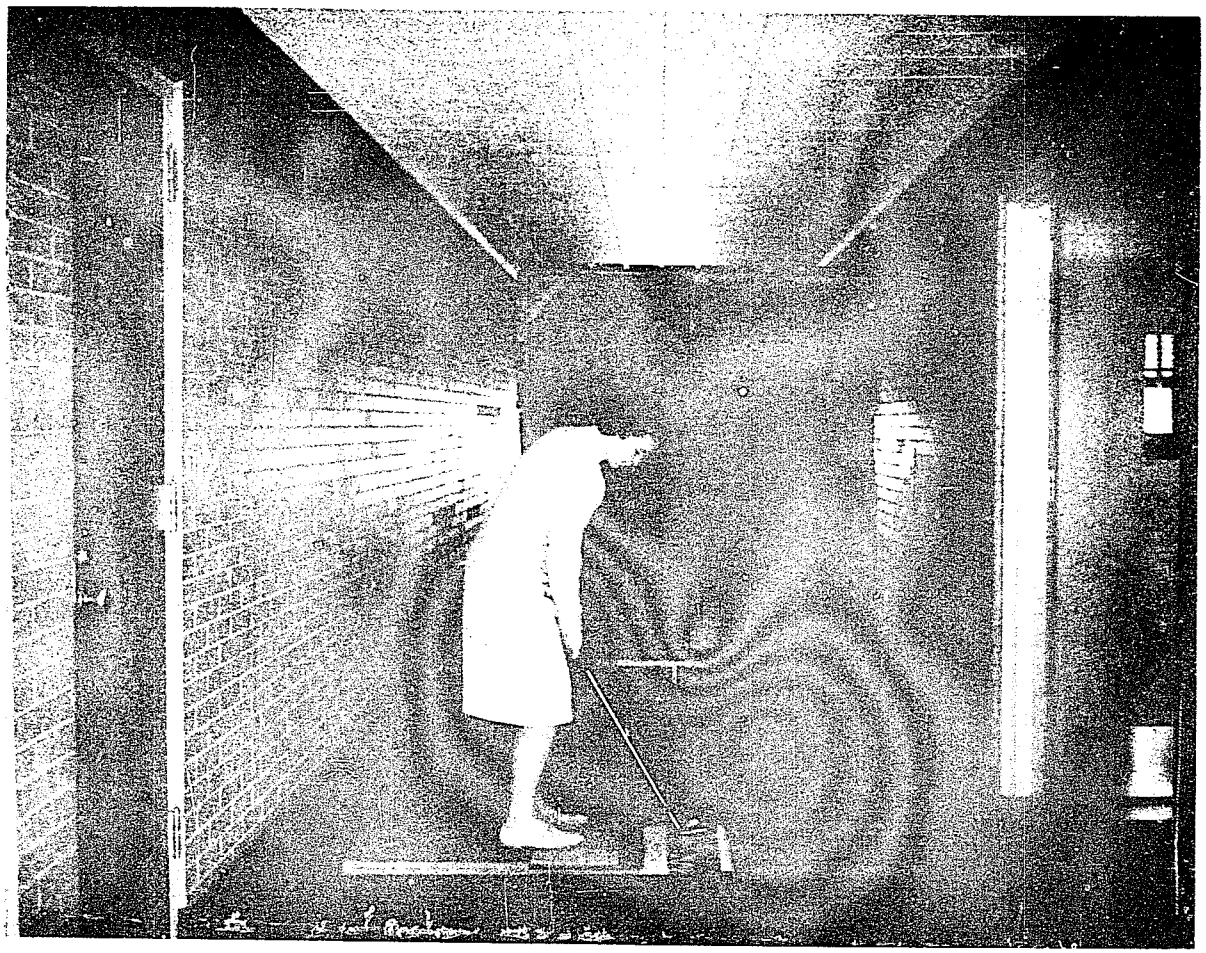


FIGURE 4

PICTORIAL ILLUSTRATION OF HARD BALL PRACTICE AREA

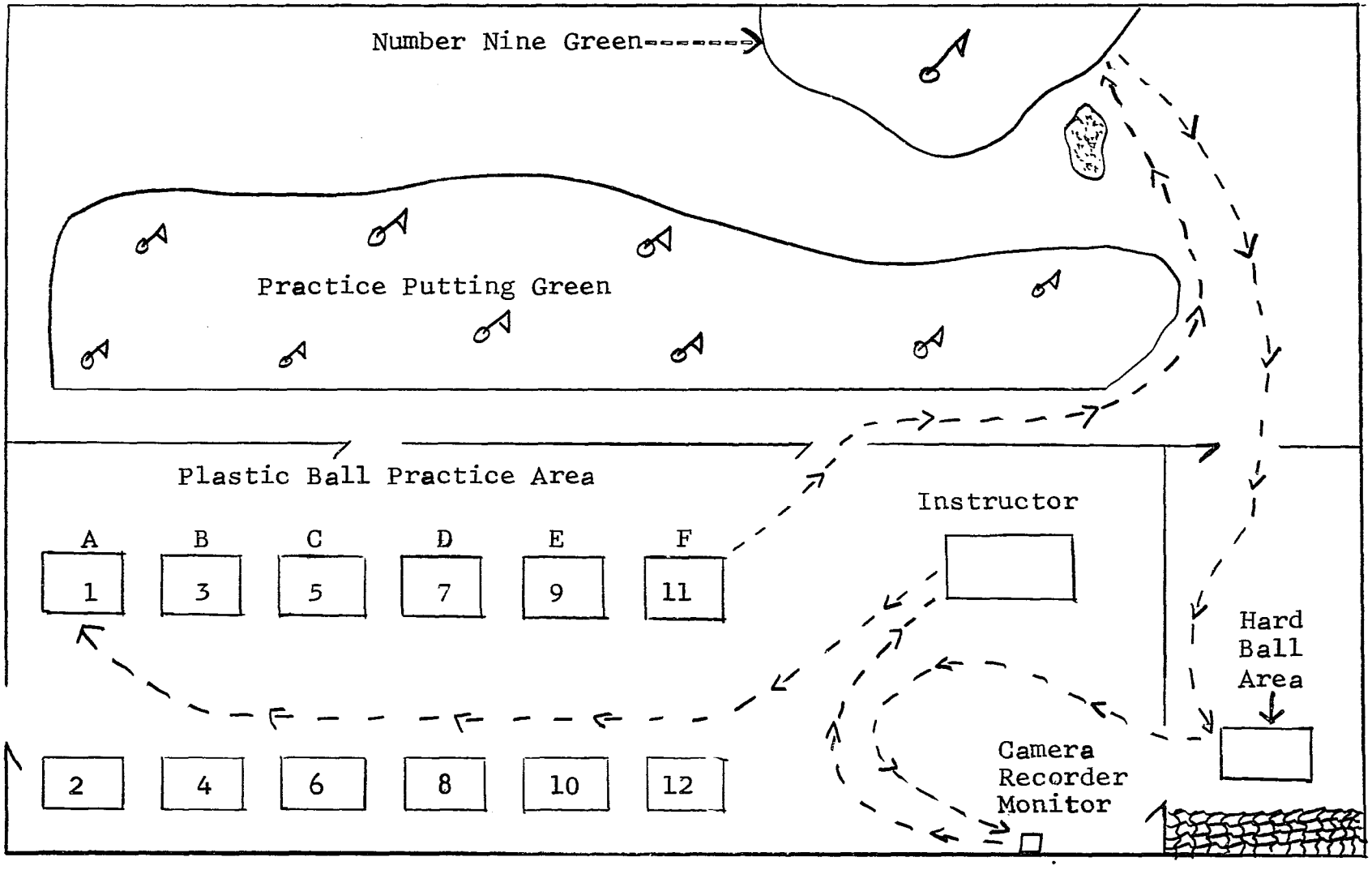


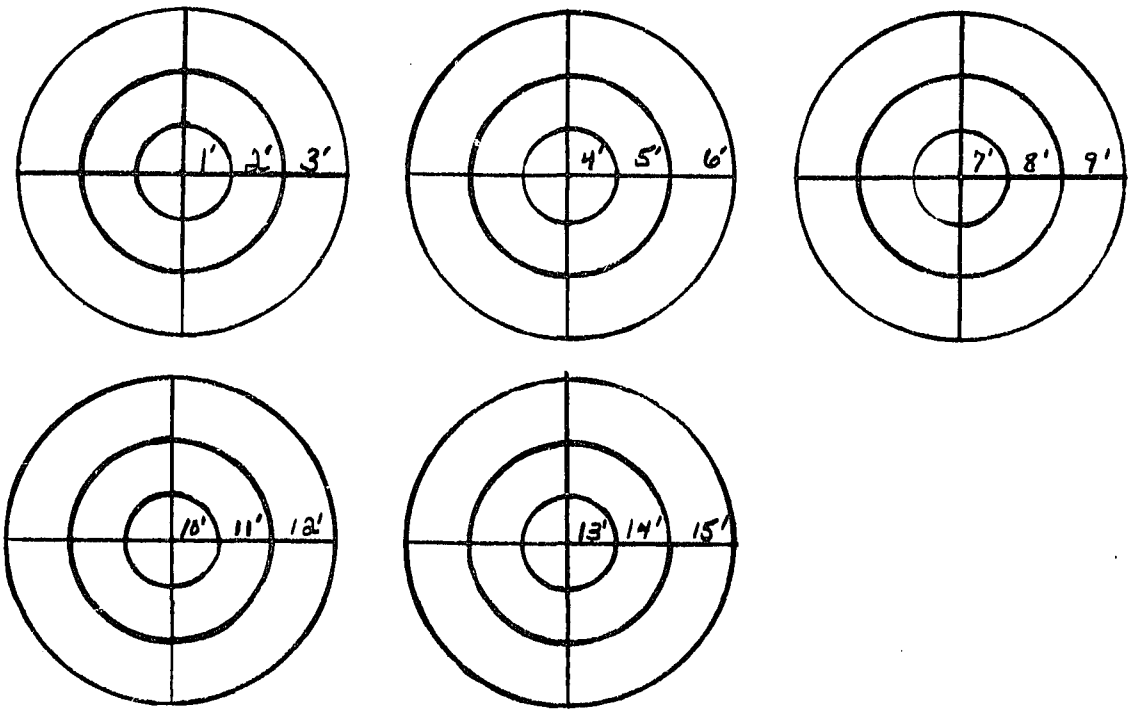
FIGURE 5

DIAGRAM OF CLASS ORGANIZATION

--------> ILLUSTRATION OF STUDENT NUMBER 11 DURING THE CLASS PERIOD.

APPENDIX B

SCORE CARDS



Yards

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'

Not Scoring _____ _____ _____ _____ _____ _____ _____

TOTAL

NAME: NUMBER:

CLASS: HOUR: DATE

FIGURE 6

ILLUSTRATION OF THE SCORE CARD

RATING SCALE

_____
Judge

I. GRIP (2 points)

1.____A. Choked

1.____B. Palms of hands facing.

Total _____

II. STANCE (5 points)

1.____A. Narrow, square or slightly open.

2.____B. Correct body posture.

1.____C. Consistant ball placement.

1.____D. Club soled square to the line of flight.

Total _____

III. SWING (14 points)

5.____A. Pendulum swing, basic hand and arm action.

2.____B. Back of left hand and palm of right hand facing point of aim through the hitting area.

3.____C. Head steady.

4.____D. Swing crisp and rhythmic.

Total _____

NAME_____ NUMBER_____ GRAND TOTAL_____

21-10 Excellent 14-10 Average 5-1 Poor
9-6 Fair
18-15 Good

FIGURE 7

PITCH AND RUN RATING SCALE FOR FORM

APPENDIX C

COPIES OF COMMUNICATIONS

LETTER REQUESTING PERMISSION TO USE BEGINNING GOLF CLASSES FOR ADMINISTERING THE PITCH AND RUN TEST IN ORDER TO ESTABLISH TEST VALIDITY

December 12, 1967

Dear Miss _____:

The Department of Health, Physical Education, and Recreation at the University of North Carolina at Greensboro, in which I am enrolled as a graduate student working toward the Doctor of Education degree, is supporting me in conducting a study entitled "The Effectiveness of Video Tape Instant Replay in Learning the Pitch and Run Shot in Golf."

I must validate a pitch and run test to be used in the study using beginning golf students. In order to do this it is important to be able to test your beginning golf classes.

This would involve a total of one class period. Approximately three students would be involved in the testing at one time, therefore, the remaining students would be able to practice in the golf room, practice range, or whatever you choose. Upon the completion of the test by the first three students, three more students would be needed - this sequence would be followed throughout the class period.

Please fill in the enclosed request sheet and place in my mailbox by December 16, 1967.

Your help in this matter will be greatly appreciated.

Sincerely,

Barbara B. Smith

_____
Advisor

REQUEST SHEET FOR GOLF TESTING ENCLOSED IN LETTER REQUESTING PERMISSION TO USE BEGINNING GOLF CLASSES FOR ADMINISTERING THE PITCH AND RUN TEST IN ORDER TO ESTABLISH TEST VALIDITY

Please check:

1. ____Yes, you may use my beginning golf classes.

2. ____No, prefer that you not use my beginning golf classes.

2. If yes to the above, which of the following dates do you prefer that I use? (Please circle date)

Class Time Date

(individual instructor's schedule inserted here)

3. In case of inclimate weather please circle an alternate date.

(individual instructor's schedule inserted here)

4. Would you like to have a copy of the results of your class (s)?

_____yes _____no

5. Would you like more information concerning the testing?

_____yes _____no

LETTER REQUESTING A MEETING OF ALL GOLF TEACHERS AT THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

January 10, 1968

Dear Miss_____:

I would like to meet with all golf teachers concerning the purpose and plans for my golf study. The meeting should take no more than thirty to forty-five minutes.

At the meeting I plan to discuss:

1. Testing the second semester intermediate golf classes on the pitch and run shot.
2. Classes to use in the study (beginning classes).
3. Explanation of the study.
4. And, suggestions and comments you may have concerning the study itself, the rating scale, and the testing of your classes in the pitch and run shot.

Thank you very much.

Sincerely,

Barbara B. Smith

Please check and return to my mail box:

____yes, I can meet on Tuesday the 23rd. at 12:00 Noon.

____no, I cannot meet on Tuesday the 23rd. at 12:00 Noon.

LETTER SENT TO INSTRUCTORS WHOSE CLASSES WERE SELECTED TO BE USED IN THE STUDY

February 6, 1967

Dear Miss_____;

This is to let you know that the following classes have been selected to be used in my golf study:

Section	Time	Instructor
127 c	10 TTH	Miss Porter
127 d	10 MW	Miss Greene
127 e	2 TTH	Miss Greene
127 f	3 TTH	Miss Porter

The study will begin February 26th. and run through March 12th. March 11 and 12 will be used for testing if weather permits. In case of inclement weather on March 11 or 12, testing will be done on the first relatively nice day thereafter as agreed upon at our meeting on January 23rd.

It will be necessary for me to know what instruction has been given the above selected classes prior to February 26th. Main points covered and general teaching method will be sufficient. I will see each of you concerning the most convenient reporting method for you.

Thank you very much for your cooperation and for not mentioning the "pitch and run" before February 26th.

Sincerely,

Barbara B. Smith

APPENDIX D

IDENTIFICATION OF JUDGES

IDENTIFICATION OF JUDGES

Judge I:

Miss Margaret Greene

Judge II:

Miss Ellen Griffin

Judge III:

Miss Nancy Porter

All three judges are members of the faculty of the Department of Health, Physical Education, and Recreation of the University of North Carolina at Greensboro.

APPENDIX E

LESSON PLANS

LESSON PLANS

Group I: Traditional Group

First Period

1. General orientation as to procedure to be followed throughout the study.
2. Emphasize that practice is not to be carried on outside of instructional periods.
3. Answer questions subjects have concerning the study.
4. Explanation-demonstration:
   --safety regulations.
   --purpose of the pitch and run shot.
   --demonstrate grip (subjects continue to use grip learned prior to study with corrections if necessary), stance (narrow and square), and swing (pendulum).
5. Practice: (inside, see Appendix A for practice area and procedure).
   --each student hit three hard balls into net that is set-up in the hall.
   --each student hit plastic balls on large mat.
   --each student practices swing on small mat.
6. Investigator:
   --individual instruction.
   --stress firm grip; square, narrow stance; ball placement; pendulum swing; and importance of target concentration.

Second Period

1. Review correct grip, stance, ball placement, pendulum swing, and target orientation.
2. Partner practice: (inside)
   --partner stand to non-target side of partner swinging and watch for a square narrow stance - help partner correct stance if necessary.
   --partner score number of times partner hits target that has been drawn on the wall - thirty trials hitting plastic balls.
3. Practice: (outside)
   --each student hit ten hard balls toward cup on number nine green.
4. Investigator:
   --at number nine green giving individual instruction.

Third Period

1. Ask for questions concerning points stressed to date.
2. Partner practice: (inside)
   --raise target from day two, partner score number of times partner hits target using plastic balls - non-swinging partner watch swinging partner's club-head at impact; if not square to line of flight inform swinging partner.
3. Investigator:
   --work with each subject hitting hard balls at inside hard ball area.

Fourth Period

1. Briefly explain testing procedure for fifth period.
2. Ask students to come at different times during the period.
3. Practice: (outside)
   --half of group hit onto number nine green, while the other half hit to ring targets using hard balls.
   --reverse above procedure mid-way through the period.
   --all subjects hit two balls at testing area to be used fifth period.

Fifth Period

1. Give the previously constructed pitch and run test.

Group II: Traditional plus Student-Teacher Analysis of Taped Performance

First Period

1. Same as Group I.
2. In addition, each hard ball performance is taped (three consectively) and immediately played back at full speed.
3. Student and teacher analyze taped performance viewing each of the three hits three times.
4. After the student has her performances playbacked, she returns to the mat practice area to practice with plastic balls.

5. The Investiagor; give individual instruction to student who has just viewed her three performances while next student, at mat near the monitor, is being taped.

Second Period

1. Same as Group I, except each subject hits seven hard balls toward the hole on number nine green.
2. In addition, each subject hits three hard balls inside while being taped, immediately point to the monitor for student-teacher analysis.
3. Investigator: gives individual instruction at mat near the monitor.
4. Thus, each student practices at mats, hard ball area and number nine green.

Third Period

1. Same as Group I.
2. In addition, follow the same procedure two through five of first period Group II.

Fourth Period

1. Same as Group I.
2. In addition, same as number 2, third period Group II

Fifth Period

1. Same as Group I.

Group III: Traditional plus Student Analysis of Taped Performance

First Period

1. Same as Group II, one through five except student only analyzes her taped performances.

Second Period

1. Same as Group II, one through four except student only analyzes her taped performances.

Third Period

1. Same as Group II, except student only analyzes her taped performances.

Fourth Period

1. Same as Group II, except student only analyzes her taped performances.

Fifth Period

1. Same as Group I.

Group IV: Loop Film plus Student Analysis of Taped Performance

First Period

1. General orientation as to procedure to be followed throughout the study.
2. Instructions:
   --the object is to get the ball as close to the hole as you can (or hole-out) using a number seven iron.

--a loop film showing how this is done has been prepared by the investigator and will be shown at the beginning of each class period for three minutes.

--you will practice with both plastic and hard balls inside and outside.

--at the hard ball area, three of your performances will be taped and played back immediately for self-analysis.

--you may view the loop film as often as you wish during the class period.

3. Organization: the same as for Groups II and III, except the investigator gives no instruction.

Second Period

1. View loop film for three minutes.
2. Same organization as for Groups II and III.

Third Period

1. View Loop film for three minutes.
2. Same organization as for Groups II and III.

Fourth Period

1. View loop film for three minutes.
2. Same organization as for Groups II and III.

Fifth Day

Same as Group I.

APPENDIX F

RAW DATA

TABLE VII

RAW DATA FROM PILOT STUDY USED IN DETERMINING THE RELIABILITY OF THE PITCH AND RUN TEST

N = 11

Subject Number	Odd Trials	Even Trials
1	27	39
2	40	38
3	25	31
4	22	24
5	20	17
6	72	62
7	70	81
8	35	37
9	77	76
10	89	100
11	54	67

TABLE VIII

RAW DATA FROM GROUPS I, II, III, AND IV USED IN DETERMINING THE RELIABILITY OF THE PITCH AND RUN TEST

N = 37

Group I			Group II			Group III			Group IV		
Sub.[1]	O[2]	E[3]	Sub.	O	E	Sub.	O	E	Sub.	O	E
1	0	7	1	15	7	1	0	0	1	0	15
2	15	7	2	3	1	2	0	0	2	0	7
3	8	7	3	23	20	3	6	14	3	26	13
4	8	11	4	40	7	4	0	0	4	24	27
5	0	9	5	11	9	5	19	17	5	14	8
6	0	13	6	0	11	6	24	23	6	0	
7	0	0	7	10	2	7	12	14	7	5	5
8	8	0	8	23	11	8	31	30	8	0	0
9	0	0	9	18	23	9	0	12	9	1	2
10	25	24									

[1]Subject Number
[2]Odd Trials
[3]Even Trials

TABLE IX

TEST SCORES AND JUDGES RATINGS USED IN ESTABLISHING THE VALIDITY OF THE PITCH AND RUN TEST

Subjects
N = 39

Judges
N = 3

Test Score	Judge I	Judge II	Judge III	Mean of Judges Ratings
5	11	16	15	14
71	12	20	17	16.3
24	13	15	15	14.3
39	14	14	15	14.3
21	14	13	15	14
0	14	11	12	12.3
16	15	14	13	14
17	13	17	19	16.3
14	13	10	11	11.3
5	14	16	17	15.6
29	12	9	14	11.6
10	8	14	14	12
29	16	7	13	12
0	8	6	10	8
36	14	16	17	15.6
24	16	13	18	15.6
2	14	13	10	12.3
47	14	15	14	14.3
58	14	8	10	10.6

TABLE IX CONTINUED

Test Score	Judge I	Judge II	Judge III	Mean of Judges Ratings
65	14	10	10	11.3
0	9	8	10	9
65	14	15	14	14.3
45	16	12	15	14.3
59	10	10	15	11.6
75	13	11	8	10.6
3	8	9	10	9
36	10	12	11	11
34	10	7	10	9
4	9	15	11	11.6
8	8	6	8	7.3
2	6	9	11	8.6
59	16	11	10	12.3
79	16	14	16	15.3
29	9	7	8	8
40	12	10	15	12.3
55	14	10	9	11
60	15	12	15	14
50	11	9	10	10
48	12	9	9	10

TABLE X

RAW DATA FOR GROUPS I, II, III, AND IV
PITCH AND RUN TEST SCORES

Group I*		Group II**		Group III***		Group IV****	
Sub.[1]	TS[2]	Sub.	TS	Sub.	TS	Sub.	TS
1	19	1	44	1	18	1	45
2	22	2	9	2	0	2	16
3	44	3	9	3	36	3	54
4	45	4	77	4	0	4	83
5	13	5	20	5	36	5	35
6	0	6	23	6	37	6	2
7	24	7	12	7	44	7	45
8	8	8	48	8	92	8	5
9	0	9	49	9	12	9	29
10	63						

* Traditional Method

** Traditional Method plus Student-Teacher Analysis of Taped Performance

*** Traditional Method plus Student Analysis of Taped Performance

**** Loop Film plus Student Analysis of Taped Performance

[1] Subject Number

[2] Test Score